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Classic Regional Approach

8
EIGHTH EDITION

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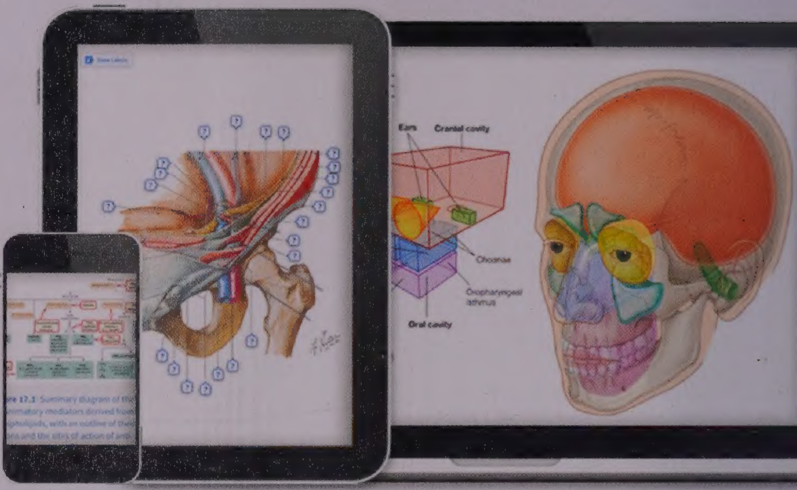

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ATLAS OF HUMAN ANATOMY: CLASSIC REGIONAL APPROACH, EIGHTH EDITION

Standard Edition: 978-0-323-68042-4
Professional Edition: 978-0-323-79373-5
International Edition: 978-0-323-79374-2

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International Standard Book Number: 978-0-323-68042-4

Publisher: Elyse O'Grady
Senior Content Strategist: Marybeth Thiel
Publishing Services Manager: Catherine Jackson
Senior Project Manager/Specialist: Carrie Stetz
Book Design: Renee Duenow

Printed in China

9 8 7 6 5 4 3 2

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PREFACE

The illustrations comprising the *Netter Atlas of Human Anatomy* were painted by physician-artists, Frank H. Netter, MD, and Carlos Machado, MD. Dr. Netter was a surgeon and Dr. Machado is a cardiologist. Their clinical insights and perspectives have informed their approaches to these works of art. The collective expertise of the anatomists, educators, and clinicians guiding the selection, arrangement, labeling, and creation of the illustrations ensures the accuracy, relevancy, and educational power of this outstanding collection.

You have a copy of the **regionally organized** 8th edition with English language terminology. This is the traditional organization and presentation that has been used since the first edition. Also available is a Latin terminology option that is also regionally organized, as well as an option with English terminology organized by body system. In all cases, the same beautiful and instructive Art Plates and Table information are included.

New to this Edition

New Art

More than 20 new illustrations have been added and over 30 art modifications have been made throughout this edition. Highlights include new views of the temporal and infratemporal fossa, pelvic fascia, nasal cavity and paranasal sinuses, plus multiple new perspectives of the heart, a cross-section of the foot, enhanced surface anatomy plates, and overviews of many body systems. In these pages you will find the most robust illustrated coverage to date for modern clinical anatomy courses.

Terminology and Label Updates

This 8th edition incorporates terms of the *Terminologia Anatomica* (2nd edition), as published by the Federative International Programme on Anatomical Terminology in 2019 (https://fipat.library.dal.ca/ta2) and adopted by the International Federation of Associations of Anatomy in 2020. A fully searchable database of the updated *Terminologia Anatomica* can be accessed at https://ta2viewer.openanatomy.org. Common clinical eponyms and former terminologies are selectively included, parenthetically, for clarity. In addition, a strong effort has been made to reduce label text on the page while maximizing label information through the use of abbreviations (muscle/s = m/mm.; artery/ies = a./aa.; vein/s = v./vv.; and nerve/s = n./nn.) and focusing on the labels most relevant to the subject of each Plate.

Nerve Tables

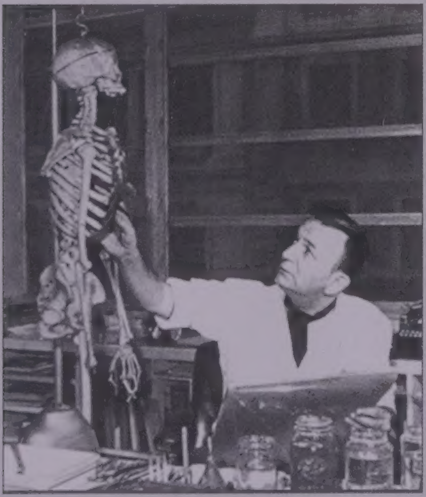
The muscle tables and clinical tables of previous editions have been so positively received that new tables have been added to cover four major nerve groups: cranial nerves and the nerves of the cervical, brachial, and lumbosacral plexuses.

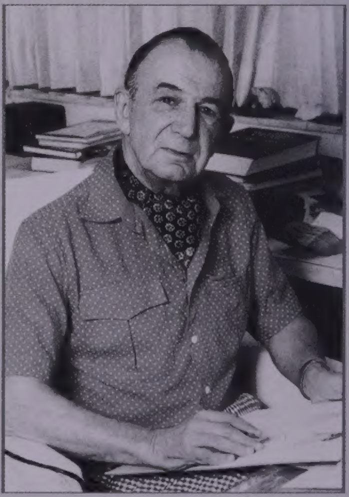
Future of the Netter Anatomy Atlas

As the Netter Atlas continues to evolve to meet the needs of students, educators, and clinicians, we welcome suggestions! Please use the following form to provide your feedback:

https://tinyurl.com/NetterAtlas8

FRANK H. NETTER, M.D.





To my dear wife, Vera

PREFACE TO THE FIRST EDITION

I have often said that my career as a medical artist for almost 50 years has been a sort of "command performance" in the sense that it has grown in response to the desires and requests of the medical profession. Over these many years, I have produced almost 4,000 illustrations, mostly for *The CIBA* (now *Netter*) *Collection of Medical Illustrations* but also for *Clinical Symposia*. These pictures have been concerned with the varied subdivisions of medical knowledge such as gross anatomy, histology, embryology, physiology, pathology, diagnostic modalities, surgical and therapeutic techniques, and clinical manifestations of a multitude of diseases. As the years went by, however, there were more and more requests from physicians and students for me to produce an atlas purely of gross anatomy. Thus, this atlas has come about, not through any inspiration on my part but rather, like most of my previous works, as a fulfillment of the desires of the medical profession.

It involved going back over all the illustrations I had made over so many years, selecting those pertinent to gross anatomy, classifying them and organizing them by system and region, adapting them to page size and space, and arranging them in logical sequence. Anatomy of course does not change, but our understanding of anatomy and its clinical significance does change, as do anatomical terminology and nomenclature. This therefore required much updating of many of the older pictures and even revision of a number of them in order to make them more pertinent to today's ever-expanding scope of medical and surgical practice. In addition, I found that there were gaps in the portrayal of medical knowledge as pictorialized in the illustrations I had previously done, and this necessitated my making a number of new pictures that are included in this volume.

In creating an atlas such as this, it is important to achieve a happy medium between complexity and simplification. If the pictures are too complex, they may be difficult and confusing to read; if oversimplified, they may not be adequately definitive or may even be misleading. I have therefore striven for a middle course of realism without the clutter of confusing minutiae. I hope that the students and members of the medical and allied professions will find the illustrations readily understandable, yet instructive and useful.

At one point, the publisher and I thought it might be nice to include a foreword by a truly outstanding and renowned anatomist, but there are so many in that category that we could not make a choice. We did think of men like Vesalius, Leonardo da Vinci, William Hunter, and Henry Gray, who of course are unfortunately unavailable, but I do wonder what their comments might have been about this atlas.

Frank H. Netter, MD
(1906–1991)

FRANK H. NETTER, MD

Frank H. Netter was born in New York City in 1906. He studied art at the Art Students League and the National Academy of Design before entering medical school at New York University, where he received his Doctor of Medicine degree in 1931. During his student years, Dr. Netter's notebook sketches attracted the attention of the medical faculty and other physicians, allowing him to augment his income by illustrating articles and textbooks. He continued illustrating as a sideline after establishing a surgical practice in 1933, but he ultimately opted to give up his practice in favor of a full-time commitment to art. After service in the United States Army during World War II, Dr. Netter began his long collaboration with the CIBA Pharmaceutical Company (now Novartis Pharmaceuticals). This 45-year partnership resulted in the production of the extraordinary collection of medical art so familiar to physicians and other medical professionals worldwide.

Icon Learning Systems acquired the Netter Collection in July 2000 and continued to update Dr. Netter's original paintings and to add newly commissioned paintings by artists trained in the style of Dr. Netter. In 2005, Elsevier Inc. purchased the Netter Collection and all publications from Icon Learning Systems. There are now over 50 publications featuring the art of Dr. Netter available through Elsevier Inc.

Dr. Netter's works are among the finest examples of the use of illustration in the teaching of medical concepts. The 13-book *Netter Collection of Medical Illustrations,* which includes the greater part of the more than 20,000 paintings created by Dr. Netter, became and remains one of the most famous medical works ever published. *The Netter Atlas of Human Anatomy,* first published in 1989, presents the anatomic paintings from the Netter Collection. Now translated into 16 languages, it is the anatomy atlas of choice among medical and health professions students the world over.

The Netter illustrations are appreciated not only for their aesthetic qualities, but, more importantly, for their intellectual content. As Dr. Netter wrote in 1949 "clarification of a subject is the aim and goal of illustration. No matter how beautifully painted, how delicately and subtly rendered a subject may be, it is of little value as a *medical illustration* if it does not serve to make clear some medical point." Dr. Netter's planning, conception, point of view, and approach are what inform his paintings and what make them so intellectually valuable.

Frank H. Netter, MD, physician and artist, died in 1991.

ABOUT THE EDITORS

Carlos A.G. Machado, MD was chosen by Novartis to be Dr. Netter's successor. He continues to be the main artist who contributes to the Netter collection of medical illustrations.

Self-taught in medical illustration, cardiologist Carlos Machado has contributed meticulous updates to some of Dr. Netter's original plates and has created many paintings of his own in the style of Netter as an extension of the Netter collection. Dr. Machado's photorealistic expertise and his keen insight into the physician/patient relationship inform his vivid and unforgettable visual style. His dedication to researching each topic and subject he paints places him among the premier medical illustrators at work today.

Learn more about his background and see more of his art at: https://netterimages.com/artist-carlos-a-g-machado.html

Paul E. Neumann, MD was clinically trained in anatomical pathology and neuropathology. Most of his research publications have been in mouse neurogenetics and molecular human genetics. In the past several years, he has concentrated on the anatomical sciences, and has frequently written about anatomical terminology and anatomical ontology in the journal *Clinical Anatomy*. As an officer of the Federative International Programme for Anatomical Terminology (FIPAT), he participated in the production of Terminologia Anatomica (2nd edition), Terminologia Embryologica (2nd edition), and Terminologia Neuroanatomica. In addition to serving as the lead Latin editor of the 8th edition of Netter's Atlas, he was a contributor to the 33rd edition of *Dorland's Illustrated Medical Dictionary*.

R. Shane Tubbs, MS, PA-C, PhD is a native of Birmingham, Alabama and a clinical anatomist. His research interests are centered around clinical/surgical problems that are identified and solved with anatomical studies. This investigative paradigm in anatomy as resulted in over 1,700 peer reviewed publications. Dr. Tubbs' laboratory has made novel discoveries in human anatomy including a new nerve to the skin of the lower eyelid, a new space of the face, a new venous sinus over the spinal cord, new connections between the parts of the sciatic nerve, new ligaments of the neck, a previously undescribed cutaneous branch of the inferior gluteal nerve, and an etiology for postoperative C5 nerve palsies. Moreover, many anatomical feasibility studies from Dr. Tubbs' laboratory have gone on to be used by surgeons from around the world and have thus resulted in new surgical/clinical procedures such as treating hydrocephalus by shunting cerebrospinal fluid into various bones, restoration of upper limb function in paralyzed patients with neurotization procedures using the contralateral spinal accessory nerve, and harvesting of clavicle for anterior cervical discectomy and fusion procedures in patients with cervical instability or degenerative spine disease.

Dr. Tubbs sits on the editorial board of over 15 anatomical journals and has reviewed for over 150 scientific journals. He has been a visiting professor to major institutions in the United States and worldwide. Dr. Tubbs has authored over 40 books and over 75 book chapters. His published books by Elsevier include *Gray's Anatomy Review*, *Gray's Clinical Photographic Dissector of the Human Body*, *Netter's Introduction to Clinical Procedures*, and *Nerves and Nerve Injuries* volumes I and II. He is an editor for the 41st and 42nd editions of the over 150-year-old *Gray's Anatomy*, the 5th through 8th editions of *Netter's Atlas of Anatomy*, and is the editor-in-chief of the journal *Clinical Anatomy*. He is the Chair of the Federative International Programme on Anatomical Terminologies (FIPAT).

Jennifer K. Brueckner-Collins, PhD is a proud Kentucky native. She pursued her undergraduate and graduate training at the University of Kentucky. During her second year of graduate school there, she realized that her professional calling was not basic science research in skeletal muscle biology, but was instead helping medical students master the anatomical sciences. She discovered this during a required teaching assistantship in medical histology, where working with students at the 10-headed microscope changed her career path.

The next semester of graduate school, she assisted in teaching dissection-based gross anatomy, although she had taken anatomy when the lab component was prosection based. After teaching in the first lab, she knew that she needed to learn anatomy more thoroughly through dissection on her own, so she dissected one to two labs ahead of the students that semester; that was when she really learned anatomy and was inspired to teach this discipline as a profession. All of this occurred in the early 1990s, when pursuing a teaching career was frowned upon by many; it was thought that you only pursued this track if you were unsuccessful in research. She taught anatomy part-time during the rest of her graduate training, on her own time, to gain requisite experience to ultimately secure a faculty position.

Dr. Brueckner-Collins spent 10 years at the University of Kentucky as a full-time faculty member teaching dissection-based gross anatomy to medical, dental, and allied health students. Then, after meeting the love of her life, she moved to the University of Louisville and has taught medical and dental students there for more than a decade. Over 20 years of teaching full time at two medical schools in the state, her teaching efforts have been recognized through receipt of the highest teaching honor at each medical school in the state, the Provost's Teaching Award at University of Kentucky, and the Distinguished Teaching Professorship at University of Louisville.

Martha Johnson Gdowski, PhD earned her BS in Biology cum laude from Gannon University in 1990, followed by a PhD in Anatomy from the Pennsylvania State University College of Medicine in 1995. She completed postdoctoral fellowships at the Cleveland Clinic and Northwestern University School of Medicine prior to accepting a faculty position in the Department of Neuroscience at the University of Rochester School of Medicine and Dentistry in 2001. Previous research interests include the development of an adult model of hydrocephalus, sensorimotor integration in the basal ganglia, and sensorimotor integration in normal and pathological aging.

Her passion throughout her career has been in her service as an educator. Her teaching has encompassed a variety of learning formats, including didactic lecture, laboratory, journal club, and problem-based learning. She has taught for four academic institutions in different capacities (The Pennsylvania State University School of Medicine, Northwestern University School of Medicine, Ithaca College, and The University of Rochester School of Medicine and Dentistry). She has taught in the following curricula: Undergraduate and Graduate Neuroscience, Graduate Neuroanatomy, Graduate Human Anatomy and Physiology for Physical Therapists, Undergraduate Medical Human Anatomy and Histology, and Undergraduate and Graduate Human Anatomy. These experiences have provided an opportunity to instruct students that vary in age, life experience, race, ethnicity, and economic background, revealing how diversity in student populations enriches learning environments in ways that benefit everyone. She has been honored to be the recipient of numerous awards for her teaching and mentoring of students during their undergraduate medical education. Martha enjoys gardening, hiking, and swimming with her husband, Greg Gdowski, PhD, and their dogs, Sophie and Ivy.

Virginia T. Lyons, PhD is an Associate Professor of Medical Education and the Associate Dean for Preclinical Education at the Geisel School of Medicine at Dartmouth. She received her BS in Biology from Rochester Institute of Technology and her PhD in Cell Biology and Anatomy from the University of North Carolina at Chapel Hill. Dr. Lyons has devoted her career to education in the anatomical sciences, teaching gross anatomy, histology, embryology, and neuroanatomy to medical students and other health professions students. She has led courses and curricula in human gross anatomy and embryology for more than 20 years and is a strong advocate for incorporating engaged pedagogies into preclinical medical education. Dr. Lyons has been recognized with numerous awards for teaching and mentoring students and was elected to the Dartmouth chapter of the Alpha Omega Alpha Honor Medical Society. She is the author of *Netter's Essential Systems-Based Anatomy* and co-author of the Human Anatomy Learning Modules website accessed by students worldwide. Dr. Lyons also serves as the Discipline Editor for Anatomy on the Aquifer Sciences Curriculum Editorial Board, working to integrate anatomical concepts into virtual patient cases that are used in multiple settings including clerkships and residency training.

Peter J. Ward, PhD grew up in Casper, Wyoming, graduating from Kelly Walsh High School and then attending Carnegie Mellon University in Pittsburgh, Pennsylvania. He began graduate school at Purdue University, where he first encountered gross anatomy, histology, embryology, and neuroanatomy. Having found a course of study that engrossed him, he helped teach those courses in the veterinary and medical programs at Purdue. Dr. Ward completed a PhD program in anatomy education and, in 2005, he joined the faculty at the West Virginia School of Osteopathic Medicine (WVSOM) in Lewisburg, West Virginia. There he has taught gross anatomy, embryology, neuroscience, histology, and the history of medicine. Dr. Ward has received numerous teaching awards, including the WVSOM Golden Key Award, the Basmajian Award from the American Association of Anatomists, and has been a two-time finalist in the West Virginia Merit Foundation's Professor of the Year selection. Dr. Ward has also been director of the WVSOM plastination facility, coordinator of the anatomy graduate teaching assistants, chair of the curriculum committee, chair of the faculty council, creator and director of a clinical anatomy elective course, and host of many anatomy-centered events between WVSOM and two Japanese Colleges of Osteopathy. Dr. Ward has also served as council member and association secretary for the American Association of Clinical Anatomists. In conjunction with Bone Clones, Inc., Dr. Ward has produced tactile models that mimic the feel of anatomical structures when intact and when ruptured during the physical examination. He created the YouTube channel Clinical Anatomy Explained! and continues to pursue interesting ways to present the anatomical sciences to the public. Dr. Ward was the Senior Associate Editor for the three volumes of *The Netter Collection: The Digestive System*, 2nd Edition, a contributor to *Gray's Anatomy*, 42nd Edition, and is author of *Netter's Integrated Musculoskeletal System: Clinical Anatomy Explained.*

Brion Benninger, MD, MBChB, MSc currently teaches surgical, imaging, and dynamic anatomy to medical students and residents in several countries (United States, New Zealand, China, Japan, Korea, The Caribbean, Mexico). He develops, invents, and assesses ultrasound probes, medical equipment, simulations, and software while identifying dynamic anatomy. He enjoys mixing educational techniques integrating macro imaging and surgical anatomy. Dr. Benninger developed the teaching theory of anatomy deconstruction/reconstruction and was the first to combine ultrasound with Google Glass during physical examination, coining the term "triple feedback examination." An early user of ultrasound, he continues to develop eFAST teaching and training techniques, has developed and shares a patent on a novel ultrasound finger probe, and is currently developing a new revolutionary ultrasound probe for breast screening. He is a reviewer for several ultrasound, clinical anatomy, surgical, and radiology journals and edits and writes medical textbooks. His research interests integrate clinical anatomy with conventional and emerging technologies to improve training techniques in situ and simulation. Dr. Benninger pioneered and coined the term "dynamic anatomy," developed a technique to deliver novel contrast medium to humans, and was the first to reveal vessels and nerves not previously seen using CT and MRI imaging. He has mentored more than 200 students on over 350 research projects presented at national and international conferences and has received numerous awards for projects related to emergency procedures, ultrasound, sports medicine, clinical anatomy, medical simulation, reverse translational research, medical education, and technology. He is proud to have received medical teaching awards from several countries and institutions, including being the first recipient in more than 25 years to receive the Commendation Medal Award from the Commission of Osteopathic Accreditation for innovative clinical anatomy teaching that he designed and facilitated in Lebanon, Oregon. Dr. Benninger has received sports medicine accolades from Sir Roger Bannister regarding his medical invention on shoulder proprioception. He is also Executive Director of the Medical Anatomy Center and collaborates with colleagues globally from surgical and nonsurgical specialties. He is also an invited course speaker for surgical anatomy in New Zealand. Dr. Benninger collects medical history books, loves mountains and sports, and is an anonymous restaurant critic. British mentors directly responsible for his training include Prof. Peter Bell (surgery), Prof. Sir Alec Jeffreys (genetic fingerprinting), Profs. David deBono and Tony Gershlick (cardiology), Prof. Roger Greenhalgh (vascular surgery), Profs. Chris Colton, John Webb, and Angus Wallace (orthopaedics), Prof. Harold Ellis CBE (surgery and clinical anatomy), and Prof. Susan Standring (Guys Hospital/Kings College).

Todd M. Hoagland, PhD is Clinical Professor of Biomedical Sciences and Occupational Therapy at Marquette University in the College of Health Sciences. Previously he was Professor of Anatomy at the Medical College of Wisconsin (MCW). Prior to MCW, Dr. Hoagland was at Boston University School of Medicine (BUSM) and he still holds an adjunct faculty position at Boston University Goldman School of Dental Medicine. Dr. Hoagland is a passionate teacher and is dedicated to helping students achieve their goals. He believes in being a strong steward of the anatomical sciences, which involves teaching it to students while contemporaneously developing resources to improve the transfer of knowledge and preparing the next generation to be even better teachers. While at BUSM, Dr. Hoagland was a leader for the Carnegie Initiative on the Doctorate in Neuroscience and helped develop the Vesalius Program (teacher training) for graduate students. The program ensures that graduate students learn about effective teaching, receive authentic experiences in the classroom, and understand how to share what they learn via scholarship.

Dr. Hoagland's dedication to health professions education has been richly rewarded by numerous teaching awards from the University of Notre Dame, BUSM, and MCW. Dr. Hoagland received the Award for Outstanding Ethical Leadership in 2009, was inducted into the Alpha Omega Alpha Honor Medical Society in 2010, received the American Association of Anatomists Basmajian Award in 2012, and was inducted into the Society of Teaching Scholars in 2012 and was their director from 2016–2020.

Dr. Hoagland's scholarly activity centers on (1) evaluating content and instructional/learning methodology in Clinical Human Anatomy and Neuroanatomy courses, especially as relevant to clinical practice, (2) translating basic anatomical science research findings into clinically meaningful information, and (3) evaluating professionalism in students to enhance their self-awareness and improve patient care outcomes. Dr. Hoagland is also consulting editor for *Netter's Atlas of Human Anatomy*, co-author for the digital anatomy textbook *AnatomyOne*, and lead author for *Clinical Human Anatomy Dissection Guide*.

ACKNOWLEDGMENTS

Carlos A. G. Machado, MD

With the completion of this 8th edition, I celebrate 27 years contributing to the Netter brand of educational products, 25 years of which have been dedicated to the update—seven editions—of this highly prestigious, from birth, *Atlas of Human Anatomy*. For these 25 years I have had the privilege and honor of working with some of the most knowledgeable anatomists, educators, and consulting editors—my treasured friends—from whom I have learned considerably.

For the last 16 years it has also been a great privilege to be part of the Elsevier team and be under the skillful coordination and orientation of Marybeth Thiel, Elsevier's Senior Content Development Specialist, and Elyse O'Grady, Executive Content Strategist. I thank both for their friendship, support, sensibility, and very dedicated work.

Once more I thank my wife Adriana and my daughter Beatriz for all their love and encouragement, and for patiently steering me back on track when I get lost in philosophical divagations about turning scientific research into artistic inspiration—and vice-versa!

It is impossible to put in words how thankful I am to my much-loved parents, Carlos and Neide, for their importance in my education and in the formation of my moral and ethical values.

I am eternally grateful to the body donors for their inestimable contribution to the correct understanding of human anatomy; to the students, teachers, health professionals, colleagues, educational institutions, and friends who have, anonymously or not, directly or indirectly, been an enormous source of motivation and invaluable scientific references, constructive comments, and relevant suggestions.

My last thanks, but far from being the least, go to my teachers Eugênio Cavalcante, Mário Fortes, and Paulo Carneiro, for their inspiring teachings on the practical application of the knowledge of anatomy.

Paul E. Neumann, MD

It has been a privilege to work on the English and Latin editions of *Netter's Atlas of Human Anatomy*. I thank the staff at Elsevier (especially Elyse O'Grady, Marybeth Thiel and Carrie Stetz), Dr. Carlos Machado, and the other editors for their efforts to produce a new, improved edition. I am also grateful to my wife, Sandra Powell, and my daughter, Eve, for their support of my academic work.

R. Shane Tubbs, MS, PA-C, PhD

I thank Elyse O'Grady and Marybeth Thiel for their dedication and hard work on this edition. As always, I thank my wife, Susan, and son, Isaiah, for their patience with me on such projects. Additionally, I thank Drs. George and Frank Salter who inspired and encouraged me along my path to anatomy.

Jennifer K. Brueckner-Collins, PhD

Reba McEntire once said "To succeed in life, you need three things: a wishbone, a backbone and a funny bone." My work with the *Netter Atlas* and the people associated with it over the past 15 years has played an instrumental role in helping me develop and sustain these three metaphorical bones in my professional and personal life.

I am forever grateful to John Hansen, who believed in my ability to serve as an editor starting with the 4th edition.

I extend my sincere thanks to Marybeth Thiel and Elyse O'Grady for not only being the finest of colleagues, but part of my professional family as well. Thanks to you both for your professionalism, support, patience, and collegiality.

To Carlos Machado, you continue to amaze me and inspire me with your special gift of bringing anatomy to life through your art.

For this edition, I also count in my blessings, the ability to work closely with the talented team of educational leaders, including Martha Gdowski, Virginia Lyons, and Peter Ward. It is humbling to work with such brilliant and dedicated teachers as we collectively assembled the systems-based *Netter Atlas* concept.

Finally, I dedicate my work on this edition with unconditional and infinite love to Kurt, Lincoln, my Dad in Heaven, as well as my dog boys, Bingo and Biscuit.

Martha Johnson Gdowski, PhD

I am grateful for the honor to work with the team of editors that Elsevier has selected for the preparation of this 8th edition; they are exceptional in their knowledge, passion as educators, and collegiality. I especially would like to thank Elyse O'Grady and Marybeth Thiel, who have been outstanding in their expertise, patience, and guidance. I am grateful to John T. Hansen, PhD, for his guidance, mentorship, and friendship as a colleague at the University of Rochester and for giving me the opportunity to participate in this work. He continues to be an outstanding role model who has shaped my career as an anatomical sciences educator. Special thanks to Carlos Machado for his gift for making challenging anatomical dissections and difficult concepts accessible to students of anatomy through his artistry, research of the details, and thoughtful discussions. I am indebted to the selfless individuals who have gifted their bodies for anatomical study, the students of anatomy, and my colleagues at the University of Rochester, all of whom motivate me to work to be the best educator I can be. I am most grateful for my loving husband and best friend, Greg, who is my greatest source of support and inspiration.

Virginia T. Lyons, PhD

It has been a joy to work with members of the editorial team on the iconic *Atlas of Human Anatomy* by Frank Netter. I would like to thank Elyse O'Grady and Marybeth Thiel for their expert guidance and ability to nourish the creative process while also keeping us focused (otherwise we would have reveled in debating anatomy minutiae for hours!). I am amazed by the talent of Carlos Machado, who is able to transform our ideas into beautiful, detailed illustrations that simplify concepts for students. I appreciate the patience and support of my husband, Patrick, and my children, Sean and Nora, who keep me sane when things get busy. Finally, I am grateful for the opportunity to teach and learn from the outstanding medical students at the Geisel School of Medicine at Dartmouth. I am fulfilled by their energy, curiosity, and love of learning.

Peter J. Ward, PhD

It is a thrill and honor to contribute to the 8th edition of *Netter's Atlas of Human Anatomy*. It still amazes me that I am helping to showcase the incomparable illustrations of Frank Netter and Carlos Machado. I hope that this atlas continues to bring these works of medical art to a new generation of students as they begin investigating the awesome enigma of the human body. Thanks to all the amazing contributors and to the hardworking team at Elsevier, especially Marybeth Thiel and Elyse O'Grady, for keeping all of us moving forward. Thank you especially to Todd Hoagland for recommending me to the team. I have immense gratitude to James Walker and Kevin Hannon, who introduced me to the world of anatomy. They both seamlessly combined high expectations for their students along with enthusiastic teaching that made the topic fascinating and rewarding. Great thanks to my parents, Robert and Lucinda Ward, for their lifelong support of my education and for the many formative museum trips to stare at dinosaur bones. Sarah, Archer, and Dashiell, you are all the reason I work hard and try to make the world a slightly better place. Your love and enthusiasm mean everything to me.

Brion Benninger, MD, MBChB, MSc

I thank all the healthcare institutions worldwide and the allopathic and osteopathic associations who have provided me the privilege to wake up each day and focus on how to improve our knowledge of teaching and healing the anatomy of the mind, body, and soul while nurturing humanism. I am grateful and fortunate to have my lovely wife, Alison, and thoughtful son, Jack, support my efforts during late nights and long weekends. Their laughs and experiences complete my life. I thank Elsevier, especially Marybeth Thiel, Elyse O'Grady, and Madelene Hyde for expecting the highest standards and providing guidance, enabling my fellow coeditors to work in a fluid diverse environment. Many thanks to Carlos Machado and Frank Netter: the world is proud. I thank clinicians who trained me, especially my early gifted surgeon/anatomist/teacher mentors, Drs. Gerald Tressidor and Harold Ellis CBE (Cambridge & Guy's Hospital); Dr. S. Standring and Dr. M. England, who embody professionalism; Drs. P. Crone, E. Szeto, and J. Heatherington, for supporting innovative medical education; my past, current, and future students and patients; and clinical colleagues from all corners of the world who keep medicine and anatomy dynamic, fresh, and wanting. Special thanks to Drs. J.L. Horn, S. Echols, J. Anderson, and J. Underwood, friends, mentors and fellow visionaries who also see "outside the box," challenging the status quo. Heartfelt tribute to my late mentors, friends, and sister, Jim McDaniel, Bill Bryan, and Gail Hendricks, who represent what is good in teaching, caring, and healing. They made this world a wee bit better. Lastly, I thank my mother for her love of education and equality and my father for his inquisitive and creative mind.

Todd M. Hoagland, PhD

It is a privilege to teach clinical human anatomy, and I am eternally grateful to all the body donors and their families for enabling healthcare professionals to train in the dissection laboratory. It is my honor to work with occupational therapy and health professions students and colleagues at Marquette University. I am grateful to John Hansen and the professionals of the Elsevier team for the opportunity to be a steward of the incomparable *Netter Atlas*. Marybeth Thiel and Elyse O'Grady were especially helpful and a pleasure to work with. It was an honor to collaborate with the brilliant Carlos Machado and all the consulting editors. I thank Dave Bolender, Brian Bear, and Rebecca Lufler for being outstanding colleagues, and I thank all the graduate students I've worked with for helping me grow as a person; it is such a pleasure to see them flourish. I am deeply appreciative of Stan Hillman and Jack O'Malley for inspiring me with masterful teaching and rigorous expectations. I am indebted to Gary Kolesari and Richard Hoyt Jr for helping me become a competent clinical anatomist, and to Rob Bouchie for the intangibles and his camaraderie. I am most grateful to my brother, Bill, for his unwavering optimism and for always being there. I thank my mother, Liz, for her dedication and love, and for instilling a strong work ethic. I am humbled by my three awesome children, Ella, Caleb, and Gregory, for helping me redefine love, wonder, and joy. Olya, ty moye solntse!

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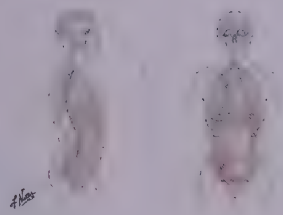
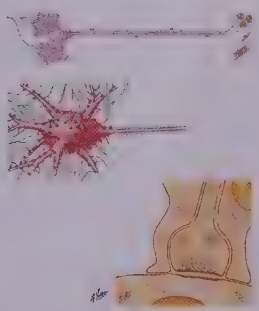

BP 2 Major Body Cavities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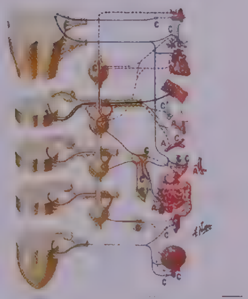
BP 8 Cholinergic and Adrenergic Synapses: Schema

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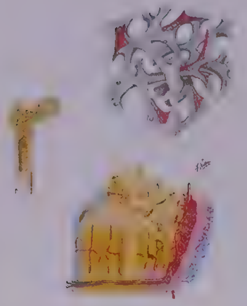

BP 9 Architecture of Bone

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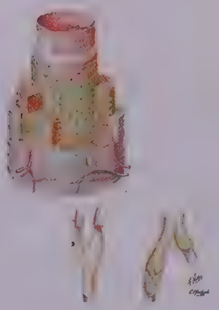
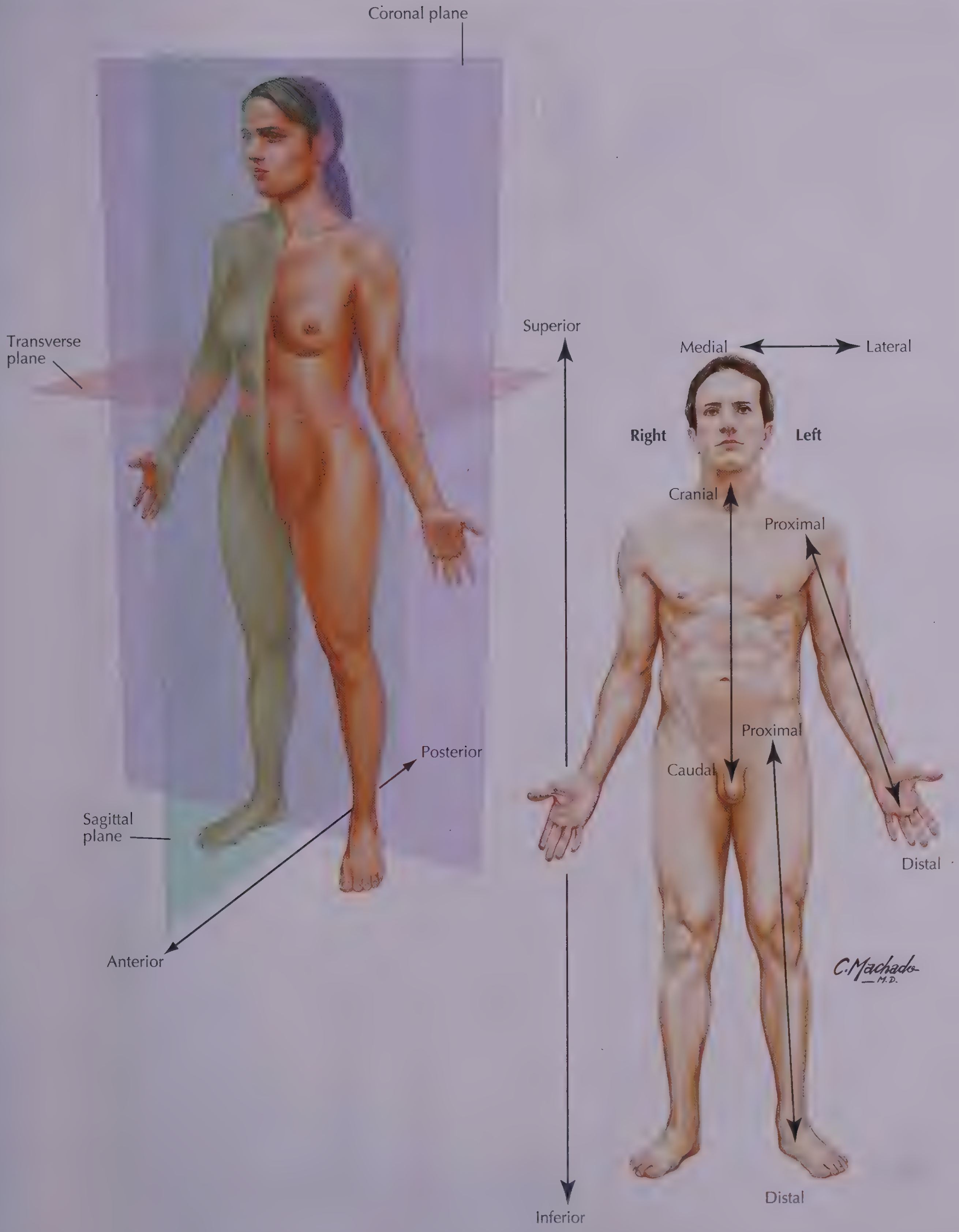
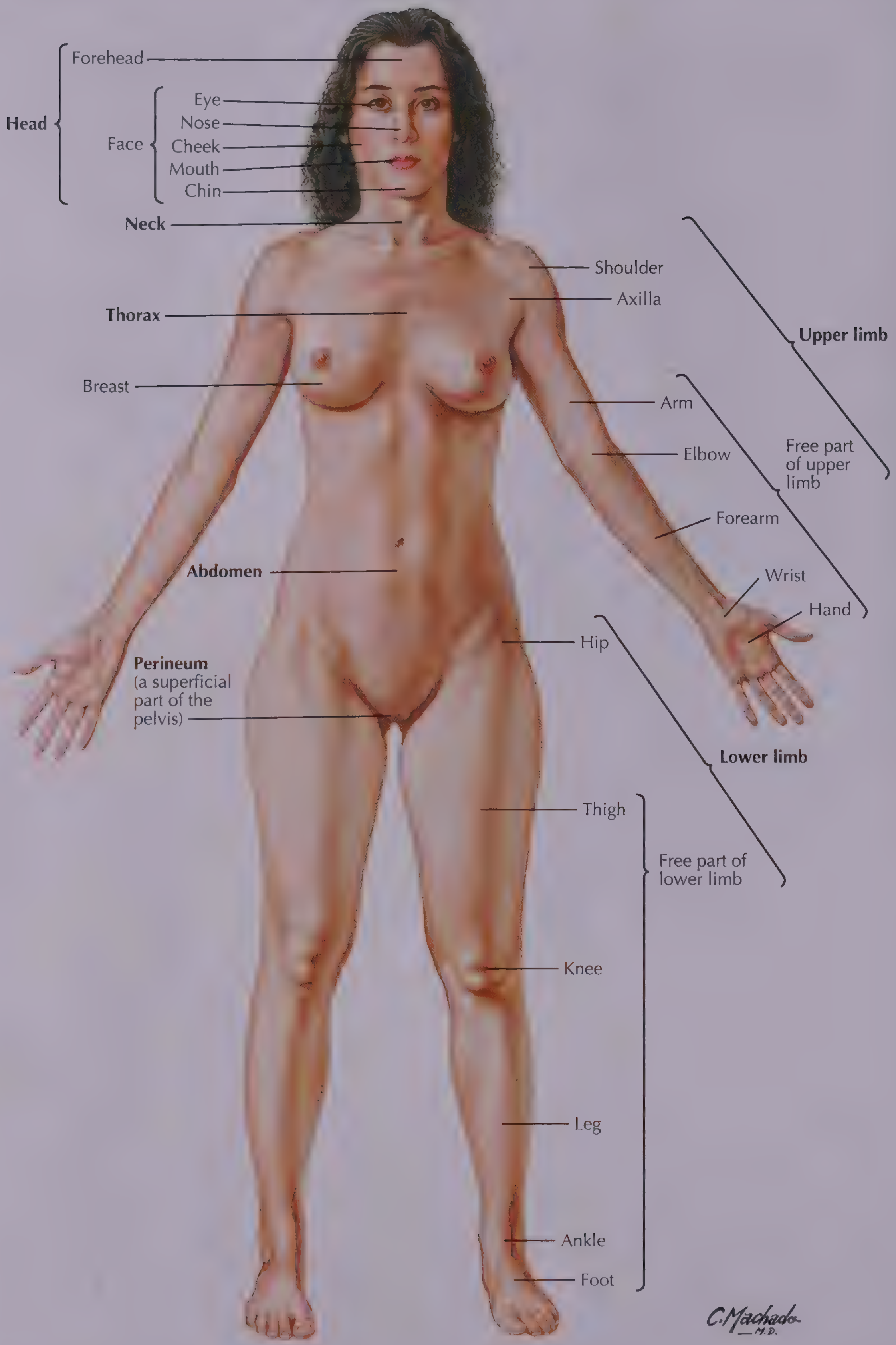
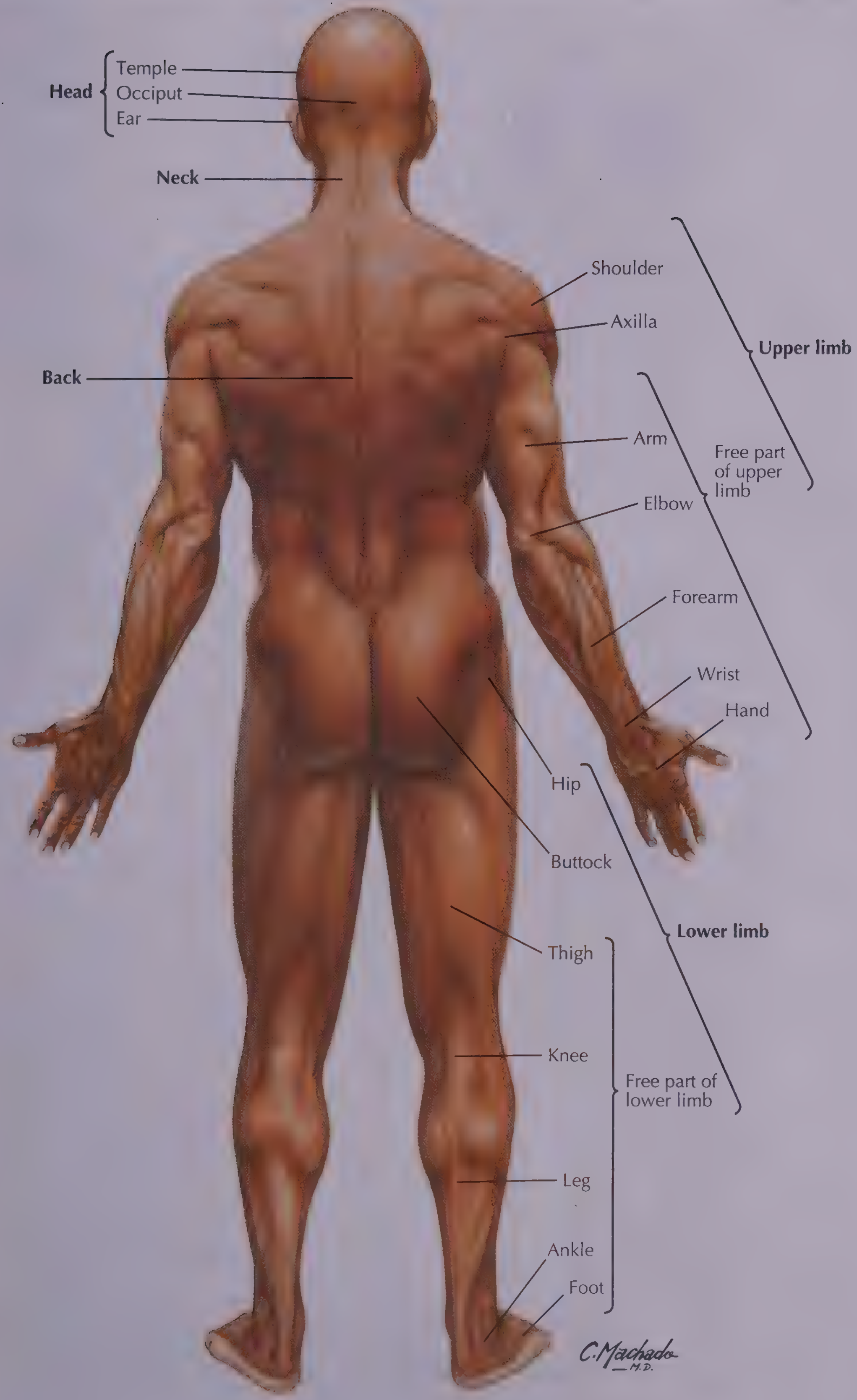


BP 13 Arterial Wall

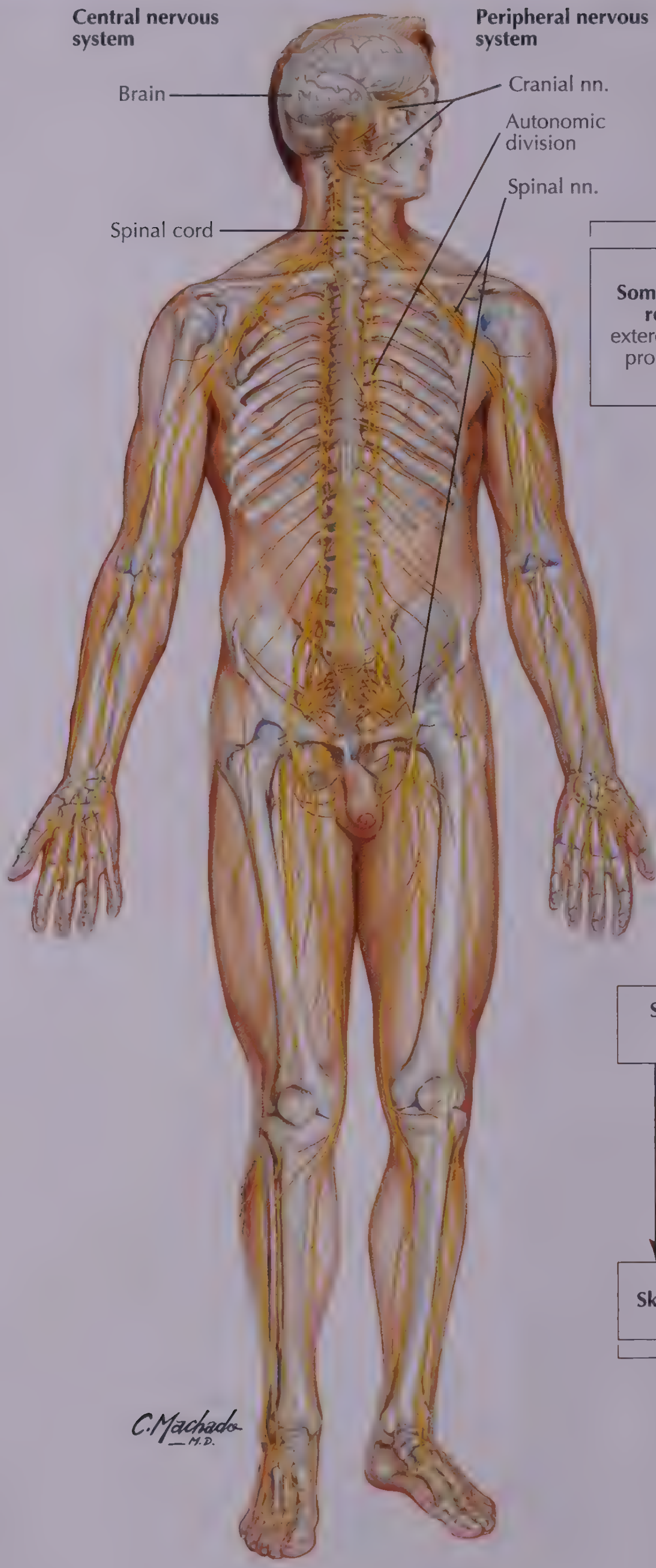

Coronal plane
Transverse plane
Sagittal plane
Posterior
Anterior
Superior
Inferior
Medial
Lateral
Right
Left
Cranial
Proximal
Proximal
Caudal
Distal
Distal
C. Machado M.D.

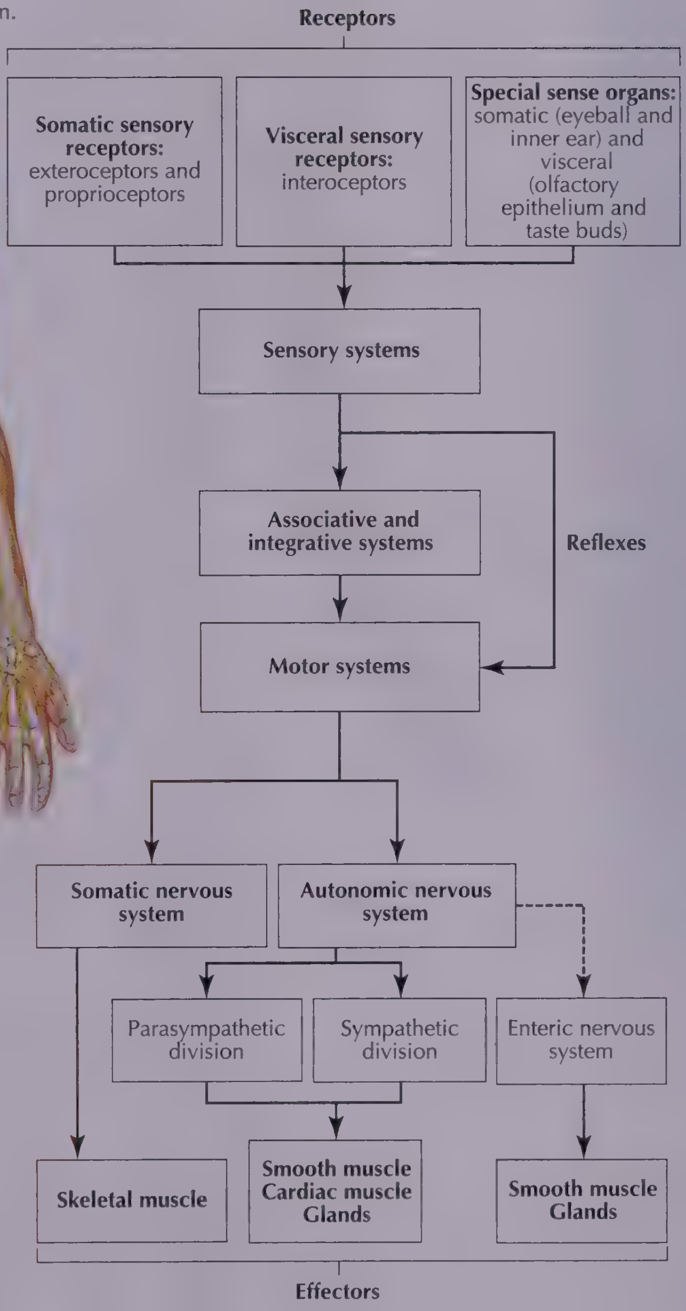
Body Parts: Anterior View of Female


Head
Forehead
Face
Eye
Nose
Cheek
Mouth
Chin
Neck
Thorax
Breast
Abdomen
Perineum
(a superficial part of the pelvis)
Shoulder
Axilla
Upper limb
Arm
Elbow
Free part of upper limb
Forearm
Wrist
Hand
Hip
Lower limb
Thigh
Free part of lower limb
Knee
Leg
Ankle
Foot
C.Machado M.D.


Head
Temple
Occiput
Ear
Neck
Back
Shoulder
Axilla
Upper limb
Arm
Free part of upper limb
Elbow
Forearm
Wrist
Hand
Hip
Buttock
Lower limb
Thigh
Knee
Free part of lower limb
Leg
Ankle
Foot
C. Machado M.D.

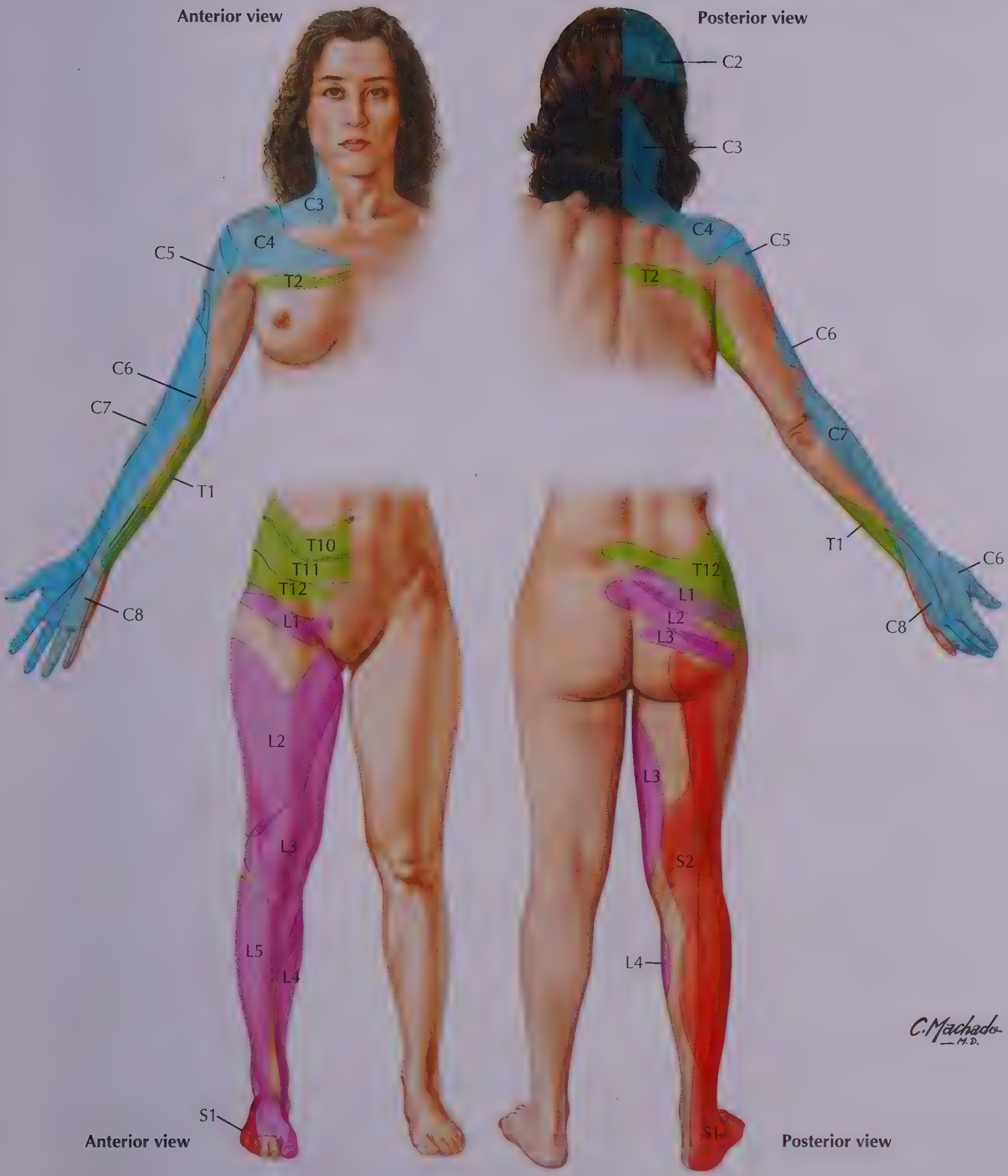
Overview of Nervous System


Central nervous system
Brain
Spinal cord
Peripheral nervous system
Cranial nn.
Autonomic division
Spinal nn.
C.Machado M.D.


Receptors
Somatic sensory receptors: exteroceptors and proprioceptors
Visceral sensory receptors: interoceptors
Special sense organs: somatic (eyeball and inner ear) and visceral (olfactory epithelium and taste buds)
Sensory systems
Associative and integrative systems
Reflexes
Motor systems
Somatic nervous system
Autonomic nervous system
Parasympathetic division
Sympathetic division
Enteric nervous system
Skeletal muscle
Smooth muscle Cardiac muscle Glands
Smooth muscle Glands
Effectors

Dermatomes of Upper and Lower Limbs

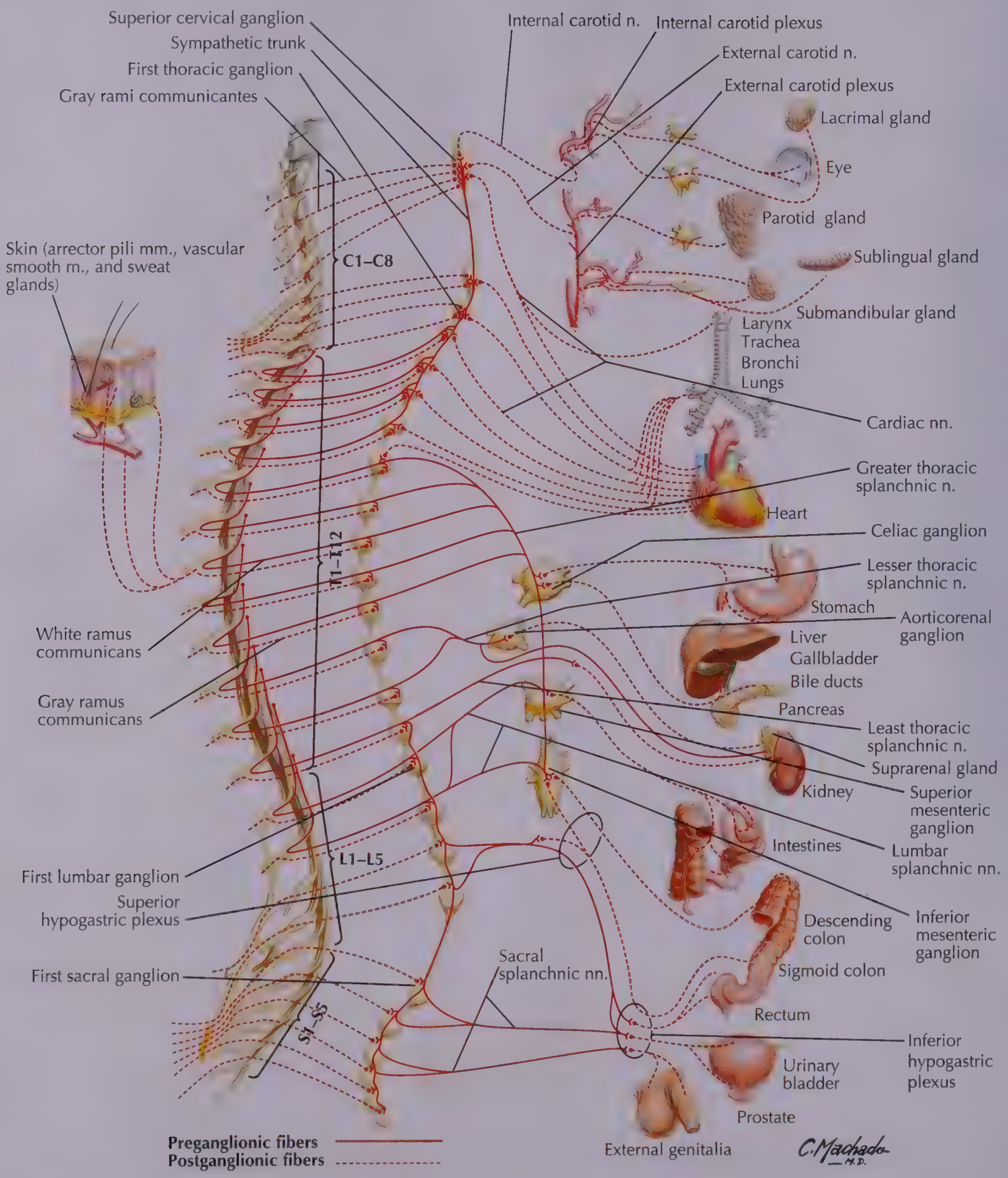
See also Plate 188


Anterior view
Posterior view
C2
C3
C3
C4
C5
T2
C6
C7
T1
C8
T10
T11
T12
L1
L2
L3
L5
L4
S1
Anterior view
C4
C5
T2
C6
C7
T1
C6
C8
T12
L1
L2
L3
L3
S2
L4
S1
Posterior view

Schematic based on Lee MW, McPhee RW, Stringer MD. An evidence-based approach to human dermatomes. Clin Anat. 2008;21(5):363–373. doi: 10.1002/ca.20636. PMID: 18470936. Please note that these areas are not absolute and vary from person to person. S3, S4, S5, and Co supply the perineum but are not shown for reasons of clarity. Of note, the dermatomes are larger than illustrated as the figure is based on best evidence; gaps represent areas in which the data are inconclusive.

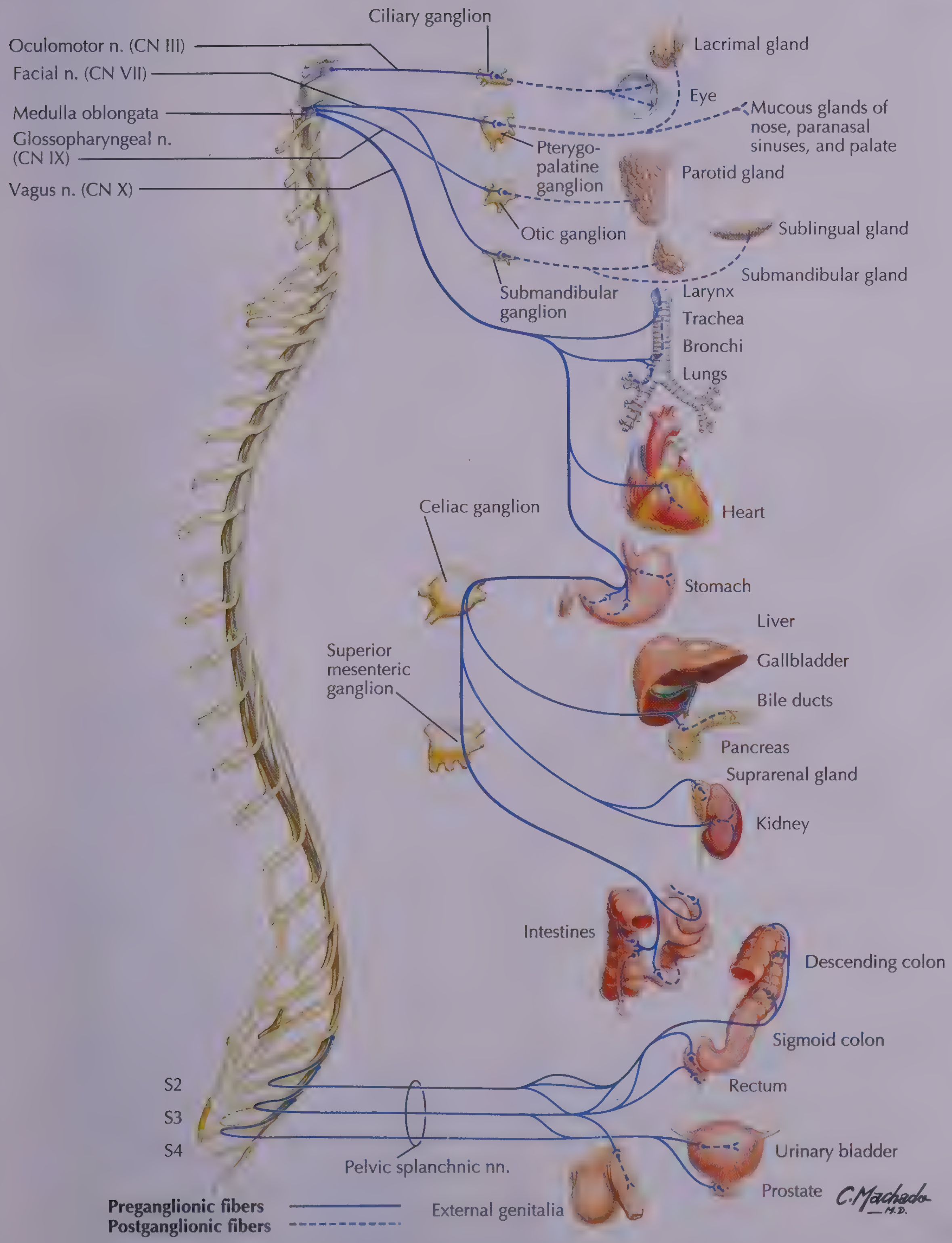
Sympathetic Nervous System: Schema

See also Plates 229, 249, 341, BP 6, BP 8, BP 52


Superior cervical ganglion
Sympathetic trunk
First thoracic ganglion
Gray rami communicantes
Internal carotid n.
Internal carotid plexus
External carotid n.
External carotid plexus
Lacrimal gland
Eye
Parotid gland
Sublingual gland
Submandibular gland
Skin (arrector pili mm., vascular smooth m., and sweat glands)
C1–C8
Larynx
Trachea
Bronchi
Lungs
Cardiac nn.
Greater thoracic splanchnic n.
Heart
T1–T12
Celiac ganglion
Lesser thoracic splanchnic n.
Stomach
Aorticorenal ganglion
White ramus communicans
Liver
Gallbladder
Bile ducts
Gray ramus communicans
Pancreas
Least thoracic splanchnic n.
Suprarenal gland
Kidney
Superior mesenteric ganglion
Intestines
Lumbar splanchnic nn.
L1–L5
First lumbar ganglion
Superior hypogastric plexus
Descending colon
Inferior mesenteric ganglion
Sacral splanchnic nn.
First sacral ganglion
Sigmoid colon
Rectum
S1–S5
Inferior hypogastric plexus
Urinary bladder
Prostate
Preganglionic fibers
Postganglionic fibers
External genitalia
C.Machado M.D.

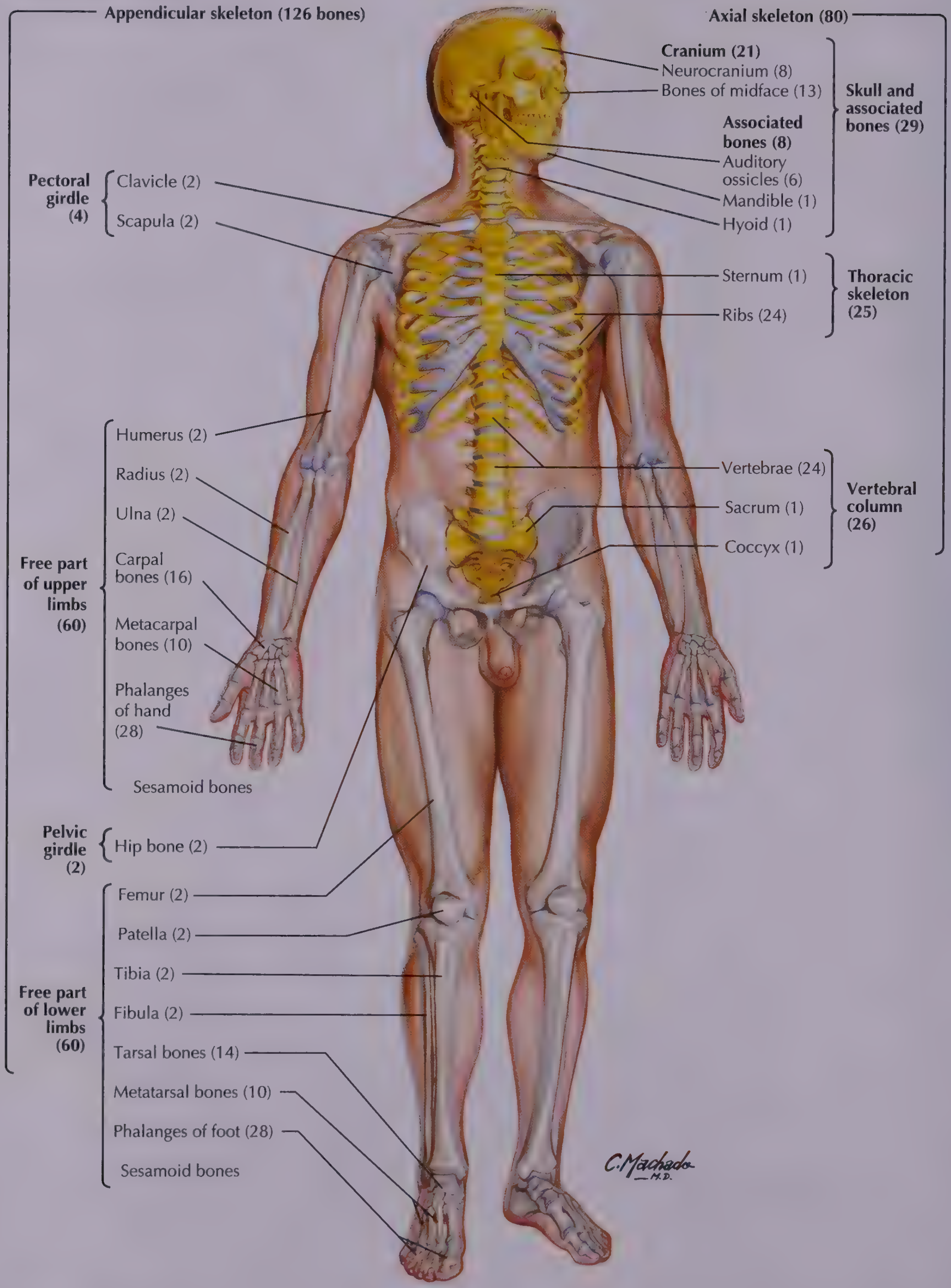
Parasympathetic Nervous System: Schema

See also Plates 324, 414, BP 7, BP 8


Ciliary ganglion
Oculomotor n. (CN III)
Facial n. (CN VII)
Medulla oblongata
Glossopharyngeal n. (CN IX)
Vagus n. (CN X)
Lacrimal gland
Eye
Mucous glands of nose, paranasal sinuses, and palate
Pterygo-palatine ganglion
Parotid gland
Otic ganglion
Sublingual gland
Submandibular gland
Submandibular ganglion
Larynx
Trachea
Bronchi
Lungs
Heart
Celiac ganglion
Stomach
Liver
Gallbladder
Bile ducts
Superior mesenteric ganglion
Pancreas
Suprarenal gland
Kidney
Intestines
Descending colon
Sigmoid colon
Rectum
S2
S3
S4
Urinary bladder
Pelvic splanchnic nn.
Prostate
External genitalia
Preganglionic fibers
Postganglionic fibers

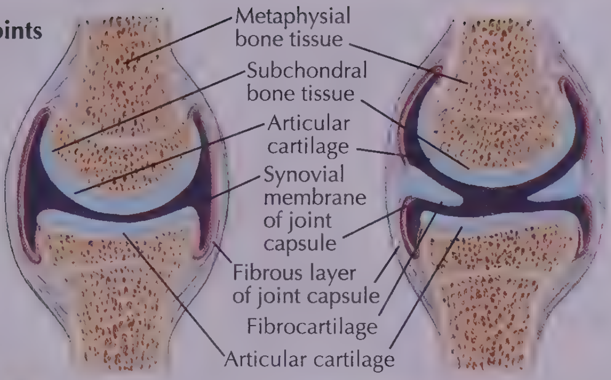
Overview of Skeletal System

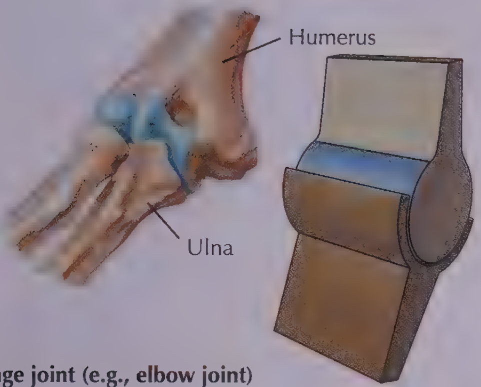
See also Plate BP 9


Appendicular skeleton (126 bones)
Axial skeleton (80)
Cranium (21)
Neurocranium (8)
Bones of midface (13)
Associated bones (8)
Auditory ossicles (6)
Mandible (1)
Hyoid (1)
Skull and associated bones (29)
Pectoral girdle (4)
Clavicle (2)
Scapula (2)
Sternum (1)
Ribs (24)
Thoracic skeleton (25)
Humerus (2)
Radius (2)
Ulna (2)
Carpal bones (16)
Metacarpal bones (10)
Phalanges of hand (28)
Sesamoid bones
Free part of upper limbs (60)
Vertebrae (24)
Sacrum (1)
Coccyx (1)
Vertebral column (26)
Pelvic girdle (2)
Hip bone (2)
Femur (2)
Patella (2)
Tibia (2)
Fibula (2)
Tarsal bones (14)
Metatarsal bones (10)
Phalanges of foot (28)
Sesamoid bones
Free part of lower limbs (60)
C.Machado M.D.

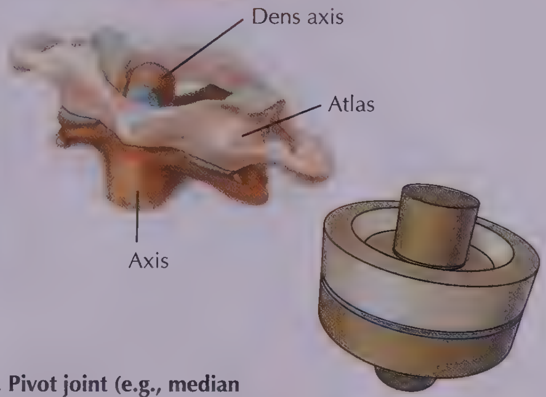
See also Plate BP 11

Structure of synovial joints

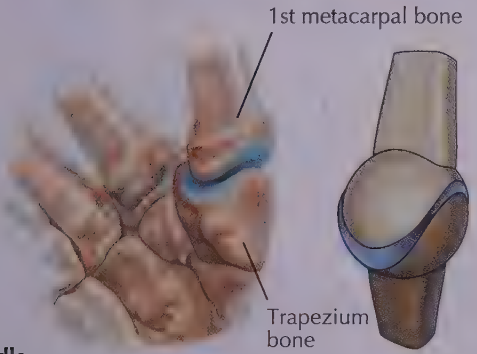

Metaphysial bone tissue
Subchondral bone tissue
Articular cartilage
Synovial membrane of joint capsule
Fibrous layer of joint capsule
Fibrocartilage
Articular cartilage


Humerus
Ulna

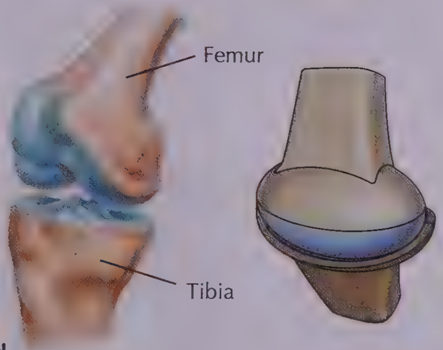
A. Hinge joint (e.g., elbow joint)


Dens axis
Atlas
Axis

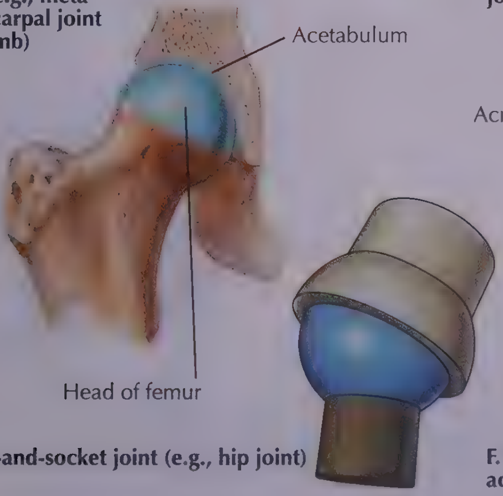
B. Pivot joint (e.g., median atlantoaxial joint)


1st metacarpal bone
Trapezium bone

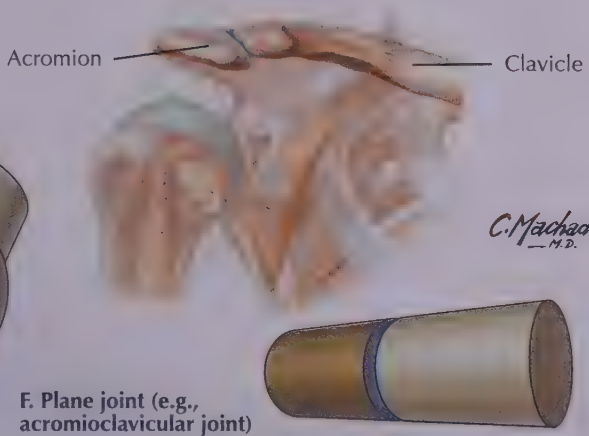
C. Saddle joint (e.g., metacarpocarpal joint of thumb)


Femur
Tibia

D. Condyloid joint (e.g., knee joint)


Acetabulum
Head of femur

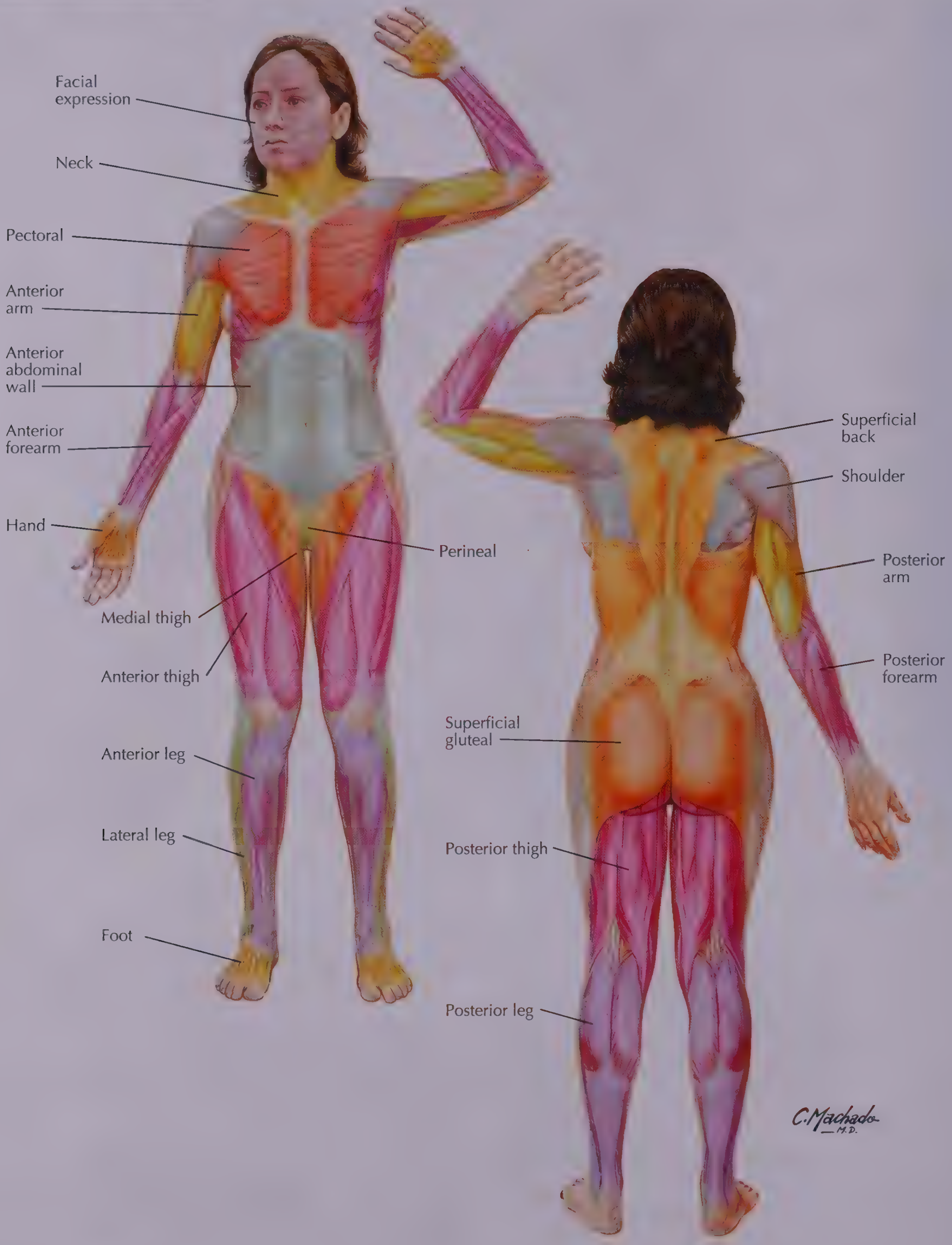
E. Ball-and-socket joint (e.g., hip joint)


Acromion
Clavicle

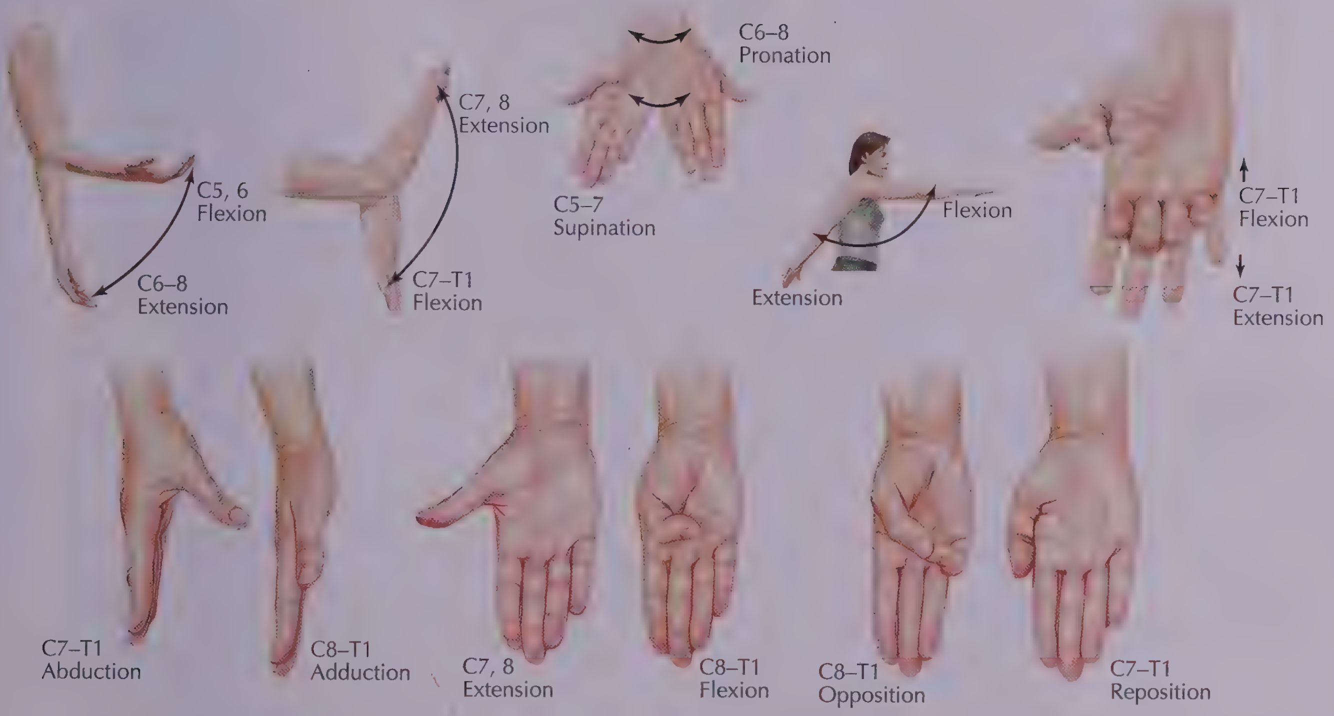
F. Plane joint (e.g., acromioclavicular joint)

Overview of Muscular System

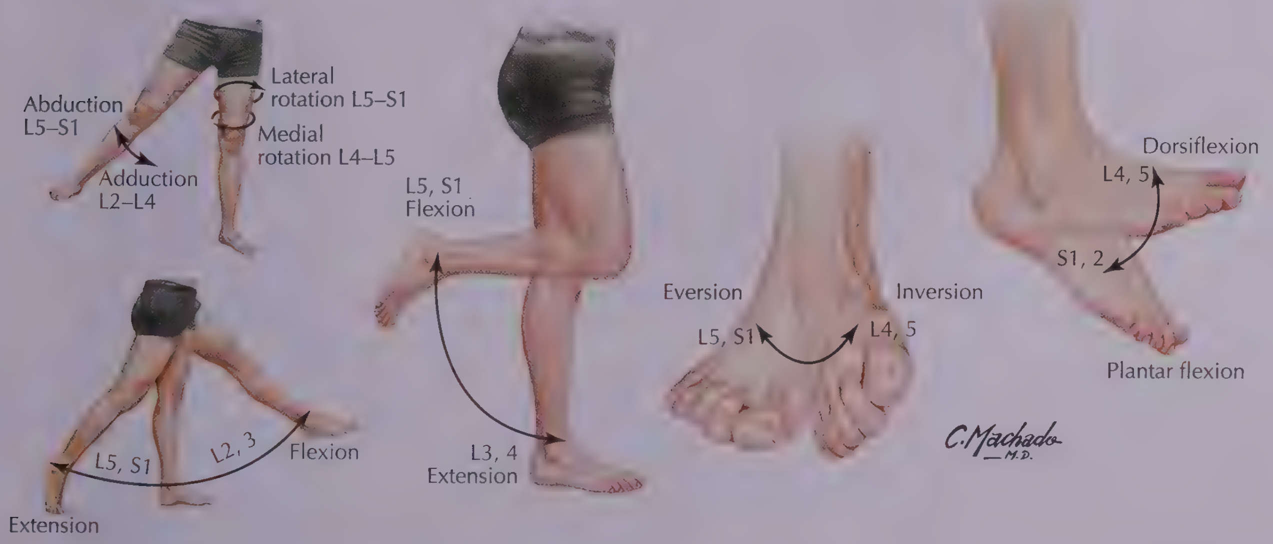
See also Plate BP 10


Facial expression
Neck
Pectoral
Anterior arm
Anterior abdominal wall
Anterior forearm
Hand
Medial thigh
Anterior thigh
Anterior leg
Lateral leg
Foot
Perineal
Superficial back
Shoulder
Posterior arm
Posterior forearm
Superficial gluteal
Posterior thigh
Posterior leg
C. Machado M.D.

Segmental innervation of upper limb movements

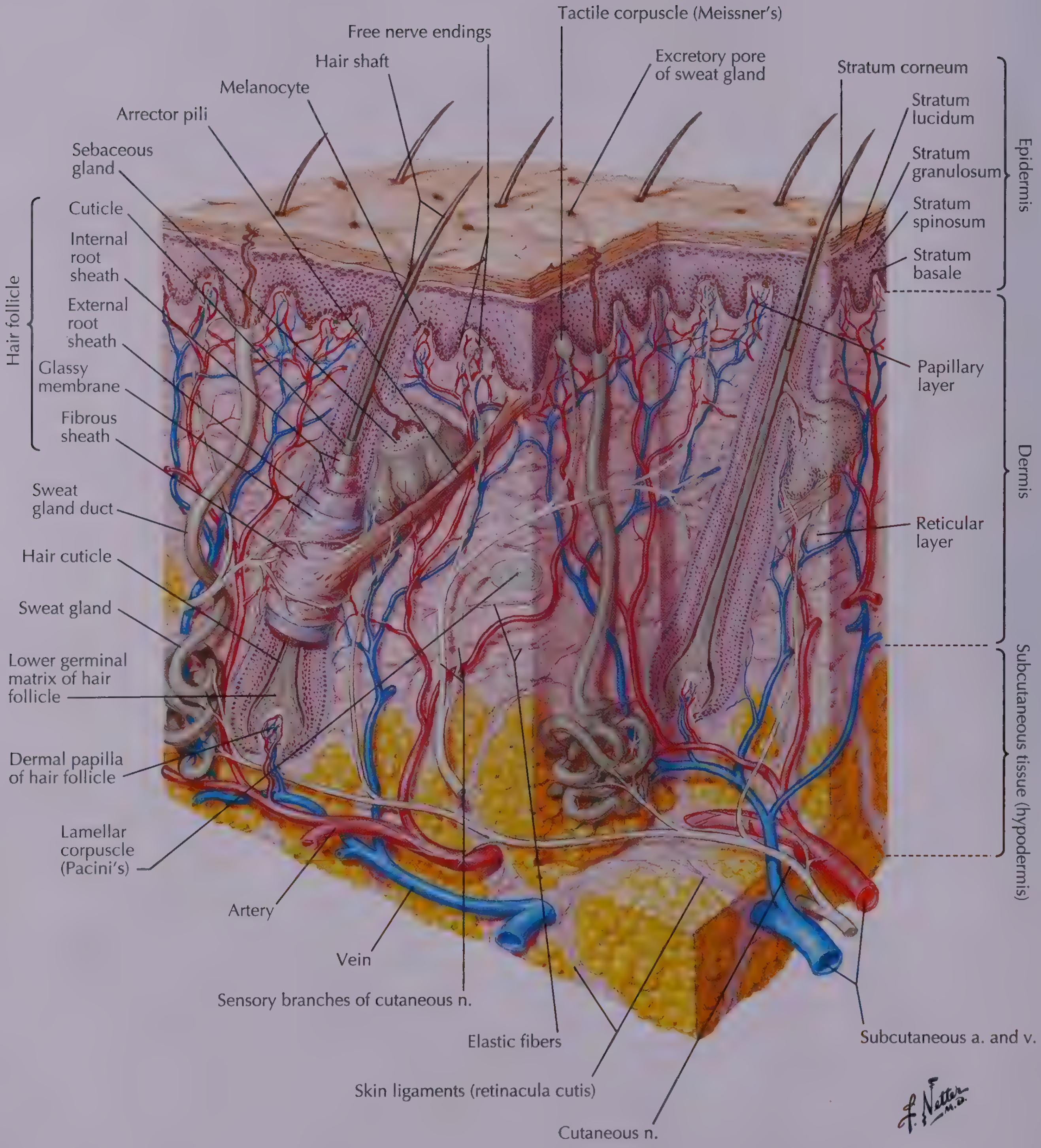

C5, 6
Flexion
C6–8
Extension
C7, 8
Extension
C7–T1
Flexion
C6–8
Pronation
C5–7
Supination
Flexion
Extension
C7–T1
Flexion
C7–T1
Extension
C7–T1
Abduction
C8–T1
Adduction
C7, 8
Extension
C8–T1
Flexion
C8–T1
Opposition
C7–T1
Reposition

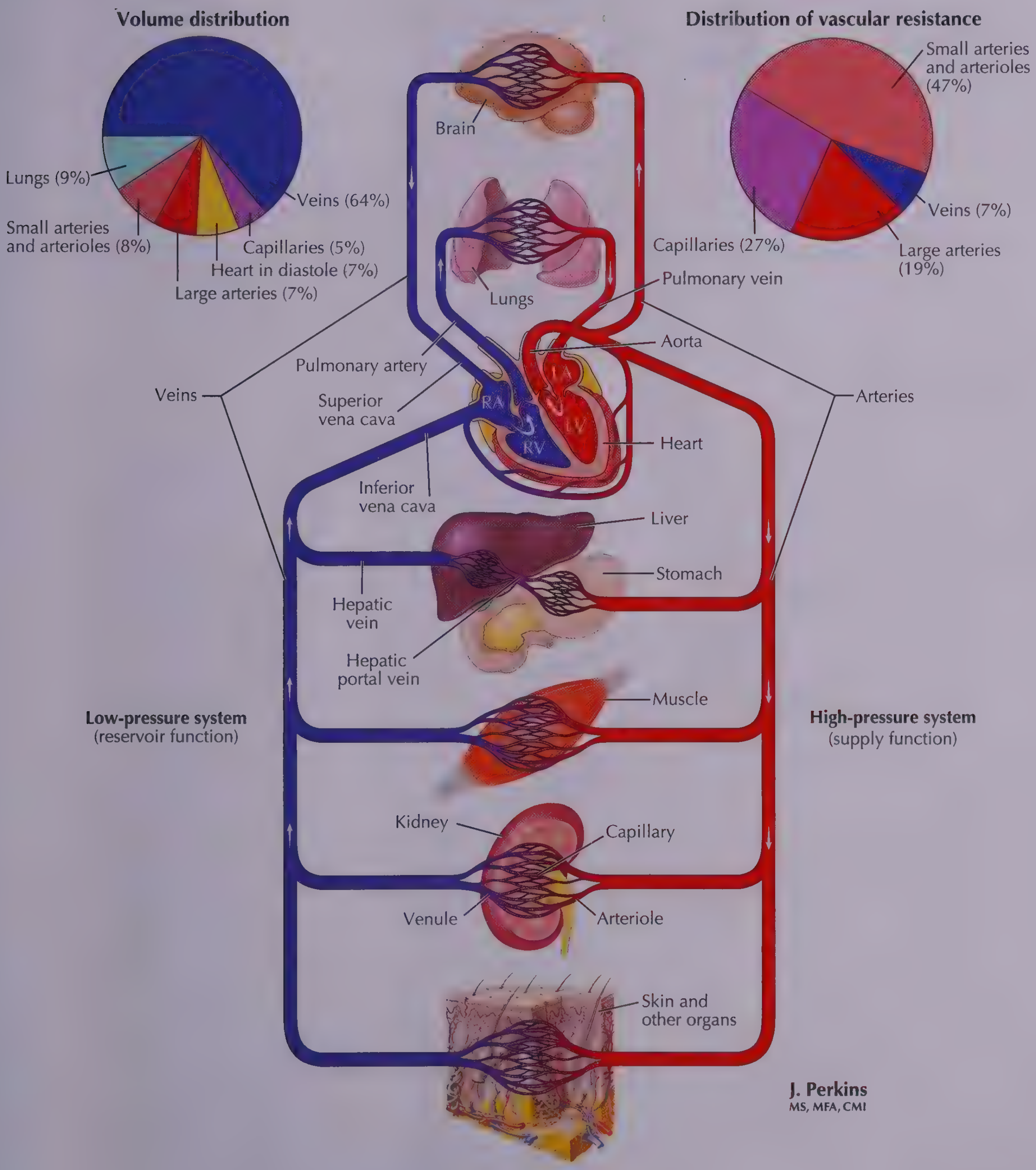
Segmental innervation of lower limb movements


Abduction
L5–S1
Adduction
L2–L4
Lateral
rotation L5–S1
Medial
rotation L4–L5
L5, S1
Flexion
L3, 4
Extension
L5, S1
L2, 3
Flexion
Extension
Eversion
L5, S1
Inversion
L4, 5
Dorsiflexion
L4, 5
S1, 2
Plantar flexion

Cross Section of Skin

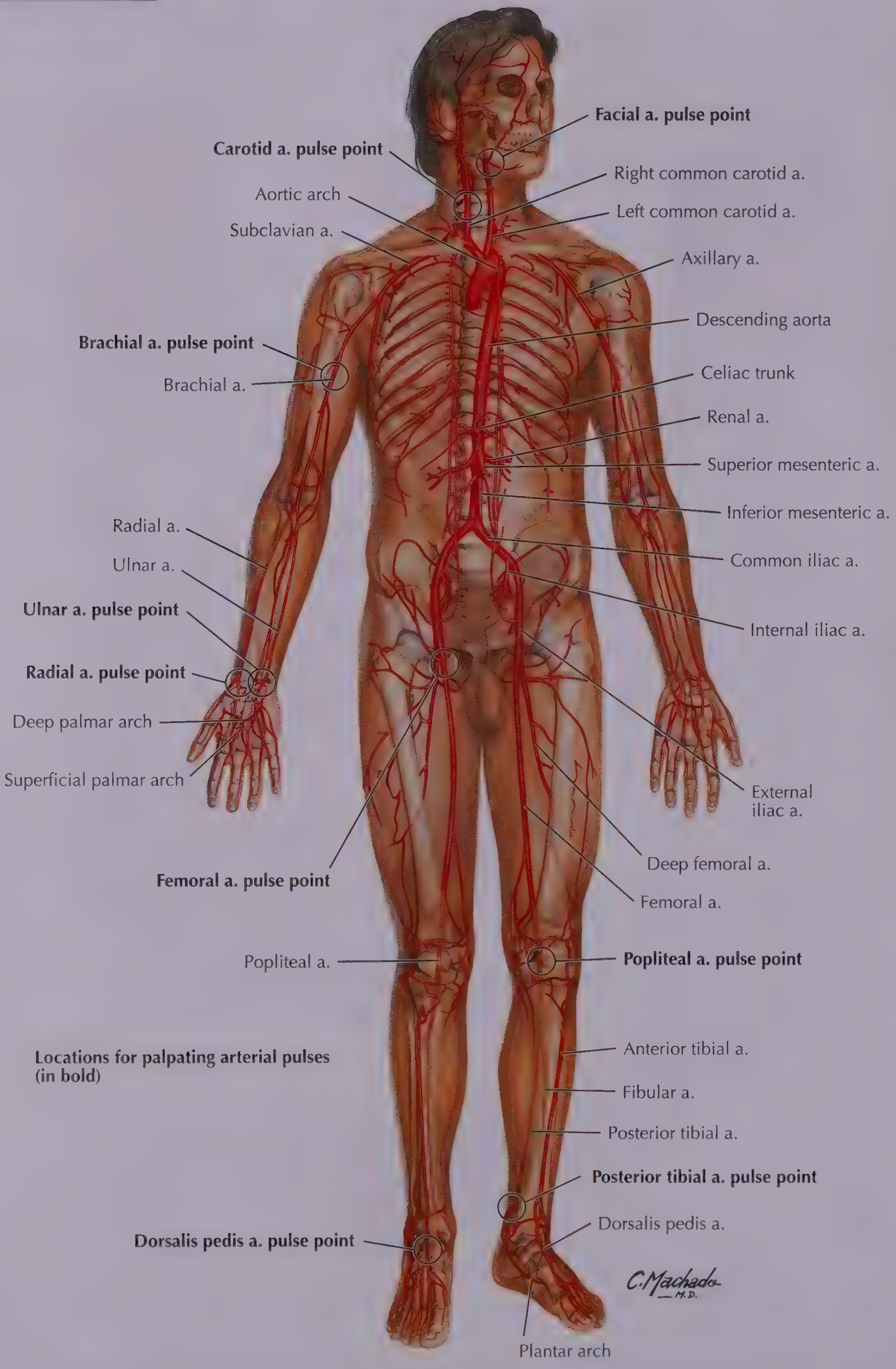
See also Plate BP 1


Tactile corpuscle (Meissner's)
Free nerve endings
Hair shaft
Melanocyte
Arrector pili
Excretory pore of sweat gland
Sebaceous gland
Stratum corneum
Stratum lucidum
Stratum granulosum
Stratum spinosum
Stratum basale
Epidermis
Hair follicle
Cuticle
Internal root sheath
External root sheath
Glassy membrane
Fibrous sheath
Papillary layer
Dermis
Reticular layer
Sweat gland duct
Hair cuticle
Sweat gland
Lower germinal matrix of hair follicle
Subcutaneous tissue (hypodermis)
Dermal papilla of hair follicle
Lamellar corpuscle (Pacini's)
Artery
Vein
Sensory branches of cutaneous n.
Elastic fibers
Skin ligaments (retinacula cutis)
Cutaneous n.
Subcutaneous a. and v.
F. Netter M.D.

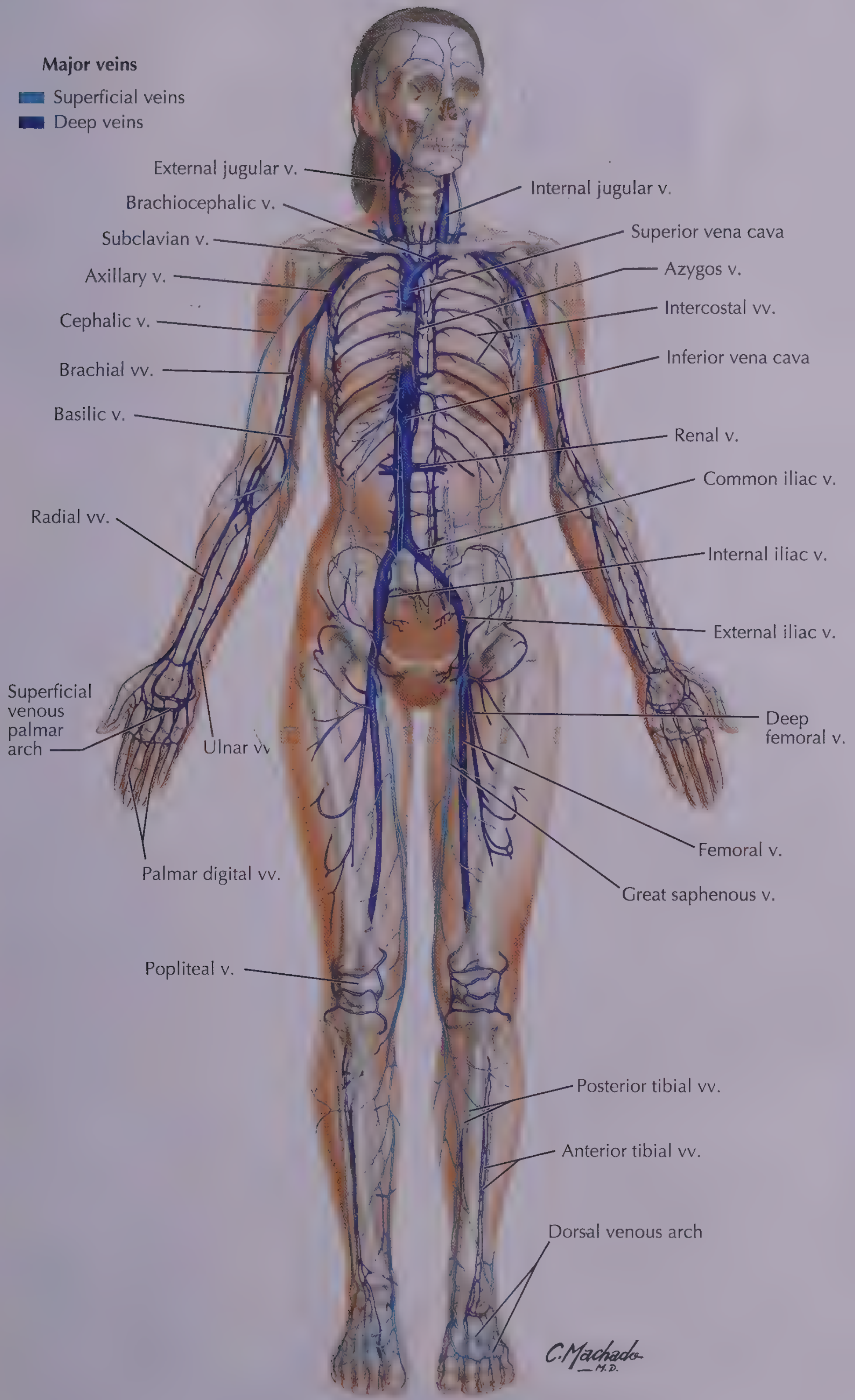

Volume distribution
Lungs (9%)
Small arteries and arterioles (8%)
Large arteries (7%)
Heart in diastole (7%)
Capillaries (5%)
Veins (64%)
Distribution of vascular resistance
Small arteries and arterioles (47%)
Veins (7%)
Large arteries (19%)
Capillaries (27%)
Brain
Lungs
Pulmonary vein
Aorta
Pulmonary artery
Superior vena cava
Veins
Arteries
RA
LA
RV
LV
Heart
Inferior vena cava
Liver
Stomach
Hepatic vein
Hepatic portal vein
Muscle
Low-pressure system
(reservoir function)
High-pressure system
(supply function)
Kidney
Capillary
Venule
Arteriole
Skin and other organs
J. Perkins
MS, MFA, CMI

Major Arteries and Pulse Points

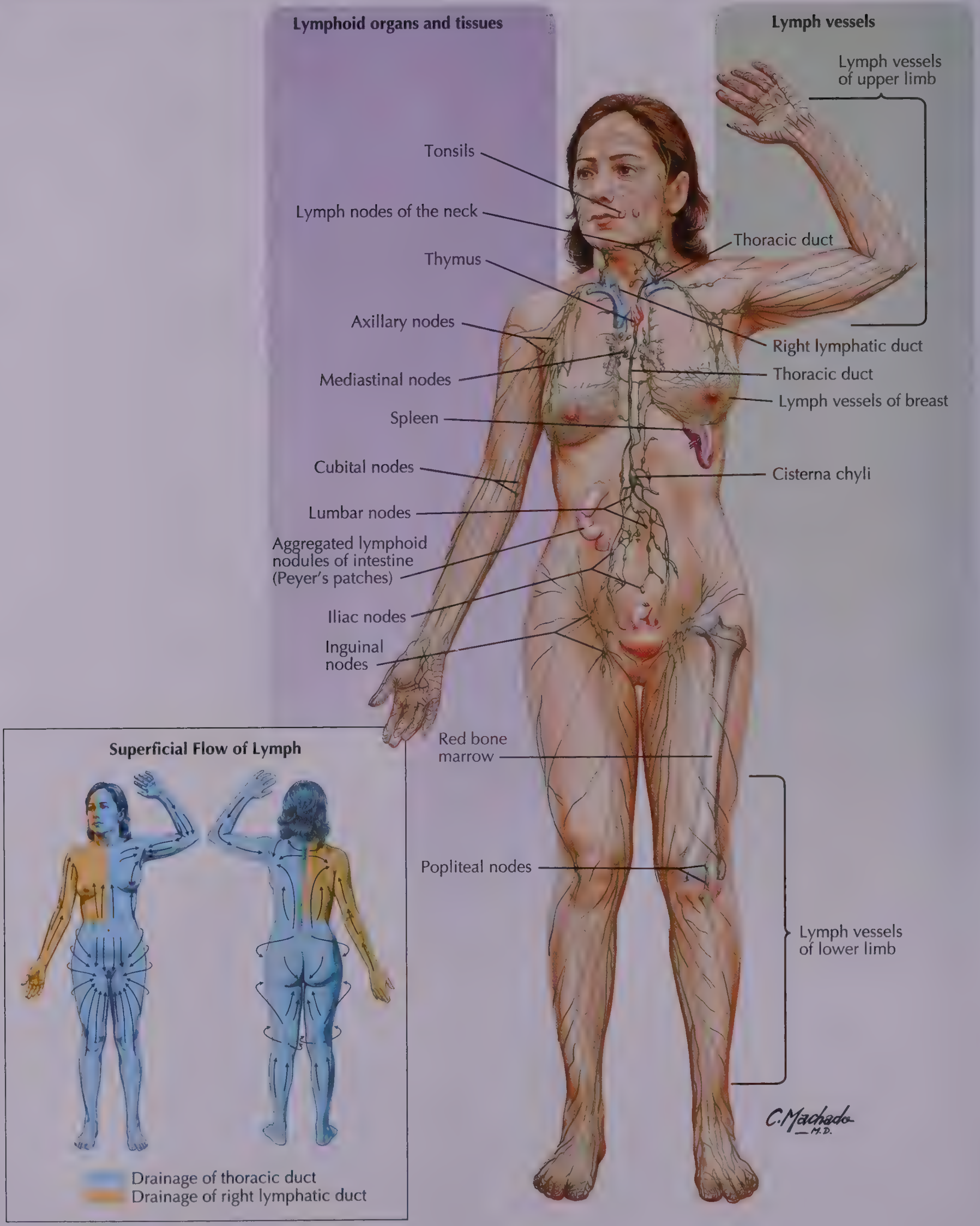
See also Plate BP 13

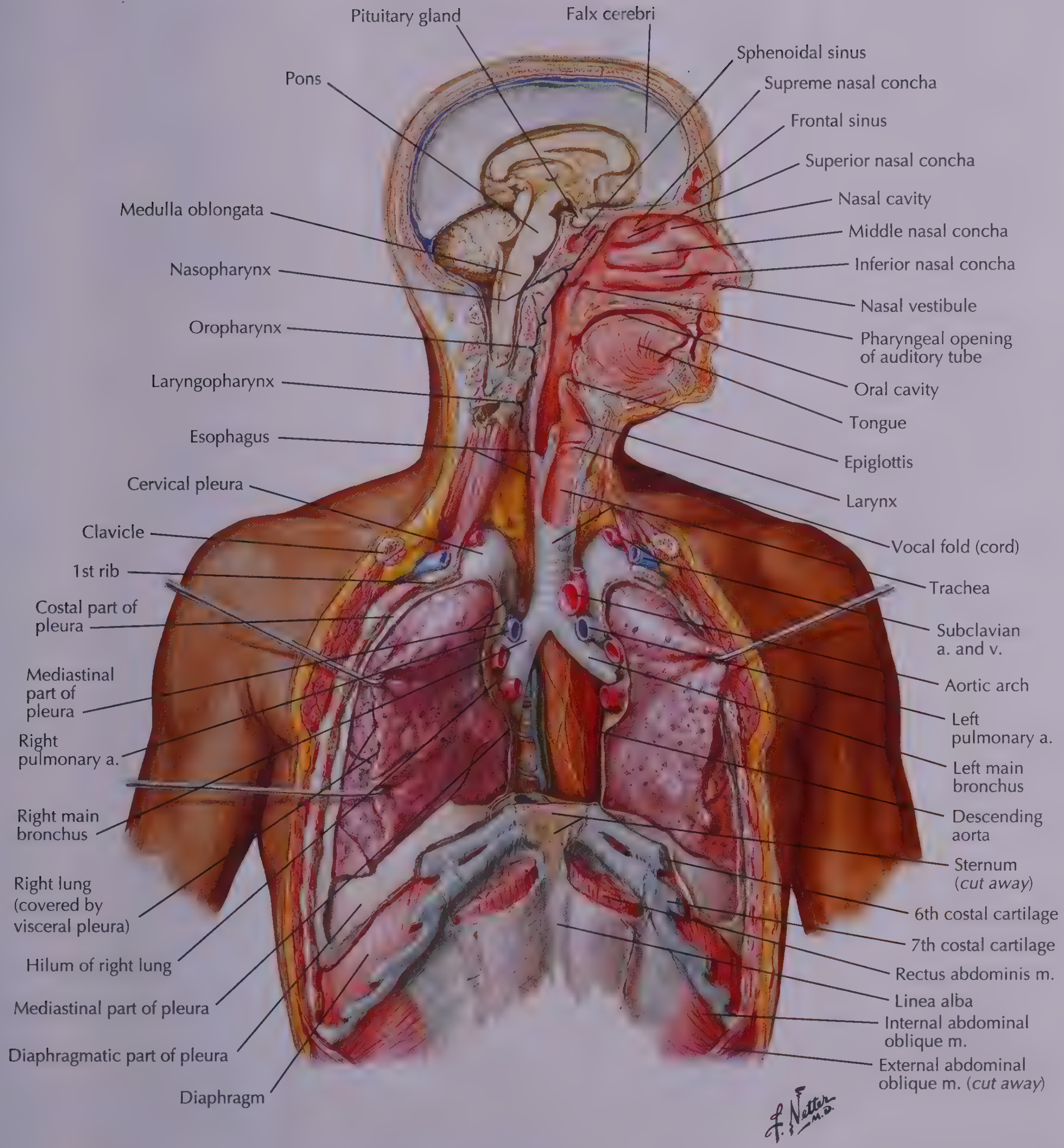

Facial a. pulse point
Carotid a. pulse point
Right common carotid a.
Aortic arch
Left common carotid a.
Subclavian a.
Axillary a.
Descending aorta
Brachial a. pulse point
Brachial a.
Celiac trunk
Renal a.
Superior mesenteric a.
Inferior mesenteric a.
Radial a.
Common iliac a.
Ulnar a.
Ulnar a. pulse point
Internal iliac a.
Radial a. pulse point
Deep palmar arch
Superficial palmar arch
External iliac a.
Deep femoral a.
Femoral a. pulse point
Femoral a.
Popliteal a.
Popliteal a. pulse point
Anterior tibial a.
Fibular a.
Posterior tibial a.
Posterior tibial a. pulse point
Dorsalis pedis a.
Dorsalis pedis a. pulse point
Plantar arch

Locations for palpating arterial pulses (in bold)

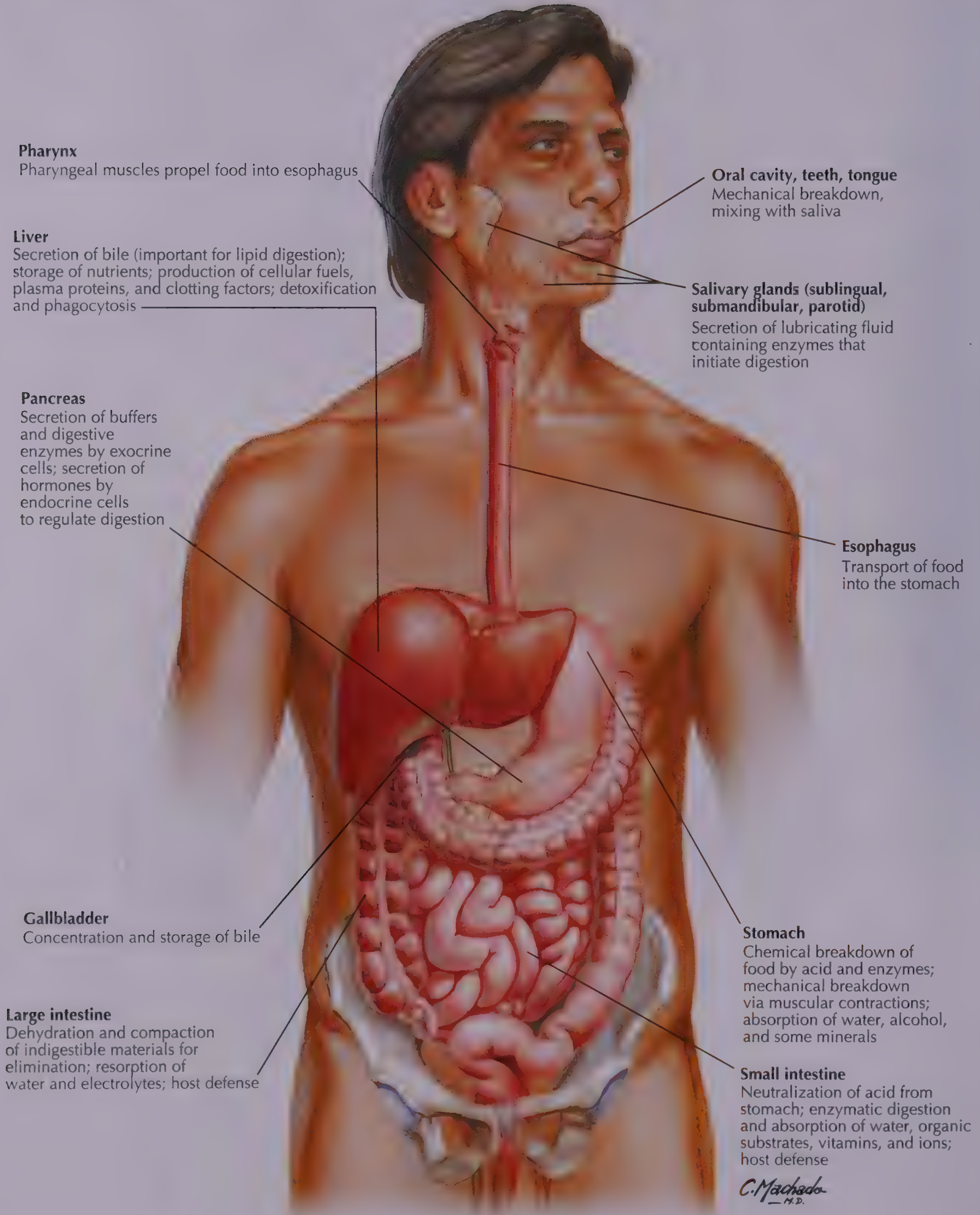

Major veins
Superficial veins
Deep veins
External jugular v.
Internal jugular v.
Brachiocephalic v.
Superior vena cava
Subclavian v.
Azygos v.
Axillary v.
Intercostal vv.
Cephalic v.
Inferior vena cava
Brachial vv.
Basilic v.
Renal v.
Common iliac v.
Radial vv.
Internal iliac v.
External iliac v.
Superficial venous palmar arch
Ulnar vv.
Deep femoral v.
Femoral v.
Palmar digital vv.
Great saphenous v.
Popliteal v.
Posterior tibial vv.
Anterior tibial vv.
Dorsal venous arch
C.Machado M.D.

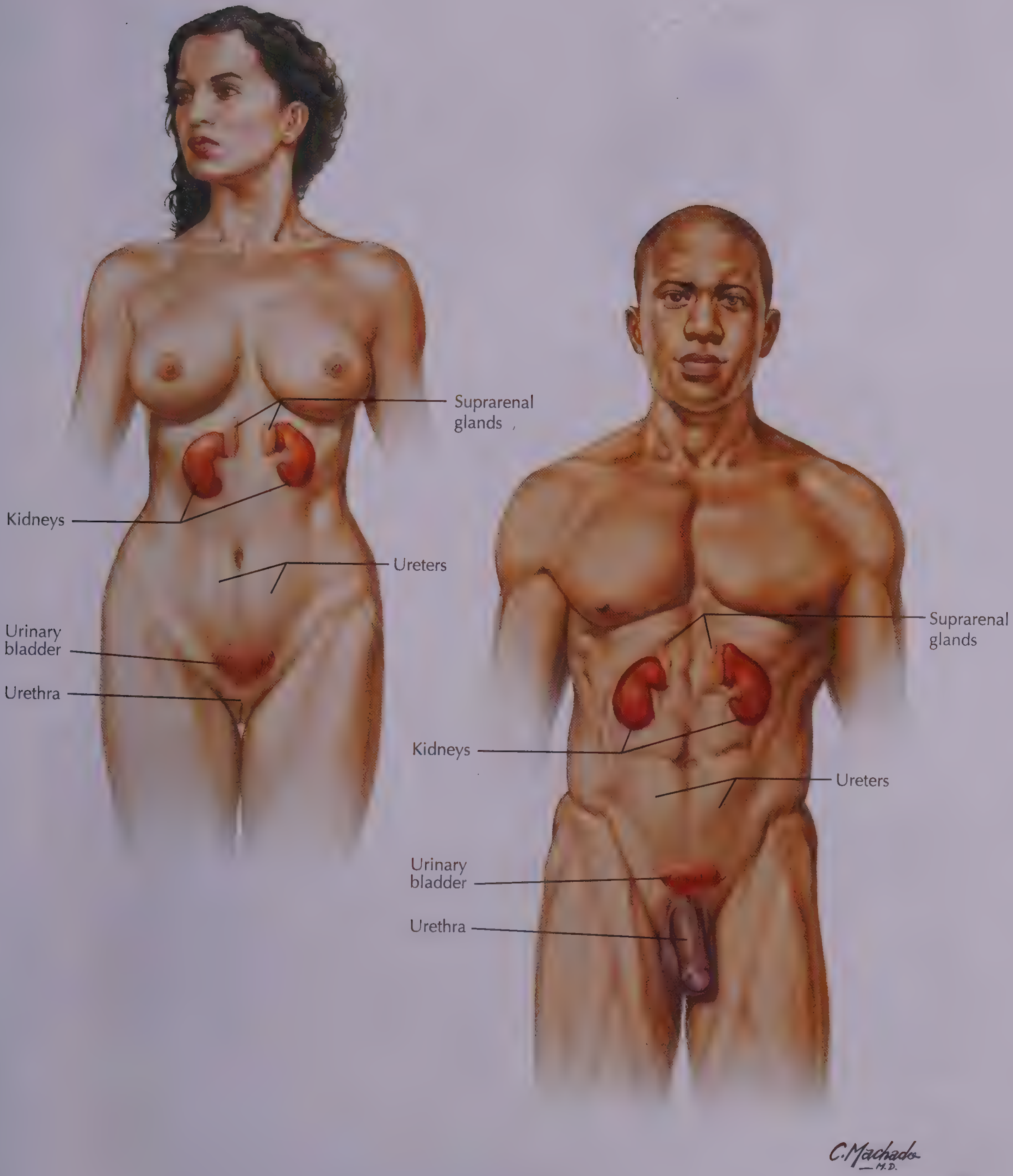
Overview of Lymph Vessels and Lymphoid Organs


Lymphoid organs and tissues
Lymph vessels
Lymph vessels of upper limb
Tonsils
Lymph nodes of the neck
Thoracic duct
Thymus
Axillary nodes
Right lymphatic duct
Mediastinal nodes
Thoracic duct
Lymph vessels of breast
Spleen
Cubital nodes
Cisterna chyli
Lumbar nodes
Aggregated lymphoid nodules of intestine (Peyer's patches)
Iliac nodes
Inguinal nodes
Red bone marrow
Popliteal nodes
Lymph vessels of lower limb
C.Machado M.D.
Superficial Flow of Lymph
Drainage of thoracic duct
Drainage of right lymphatic duct

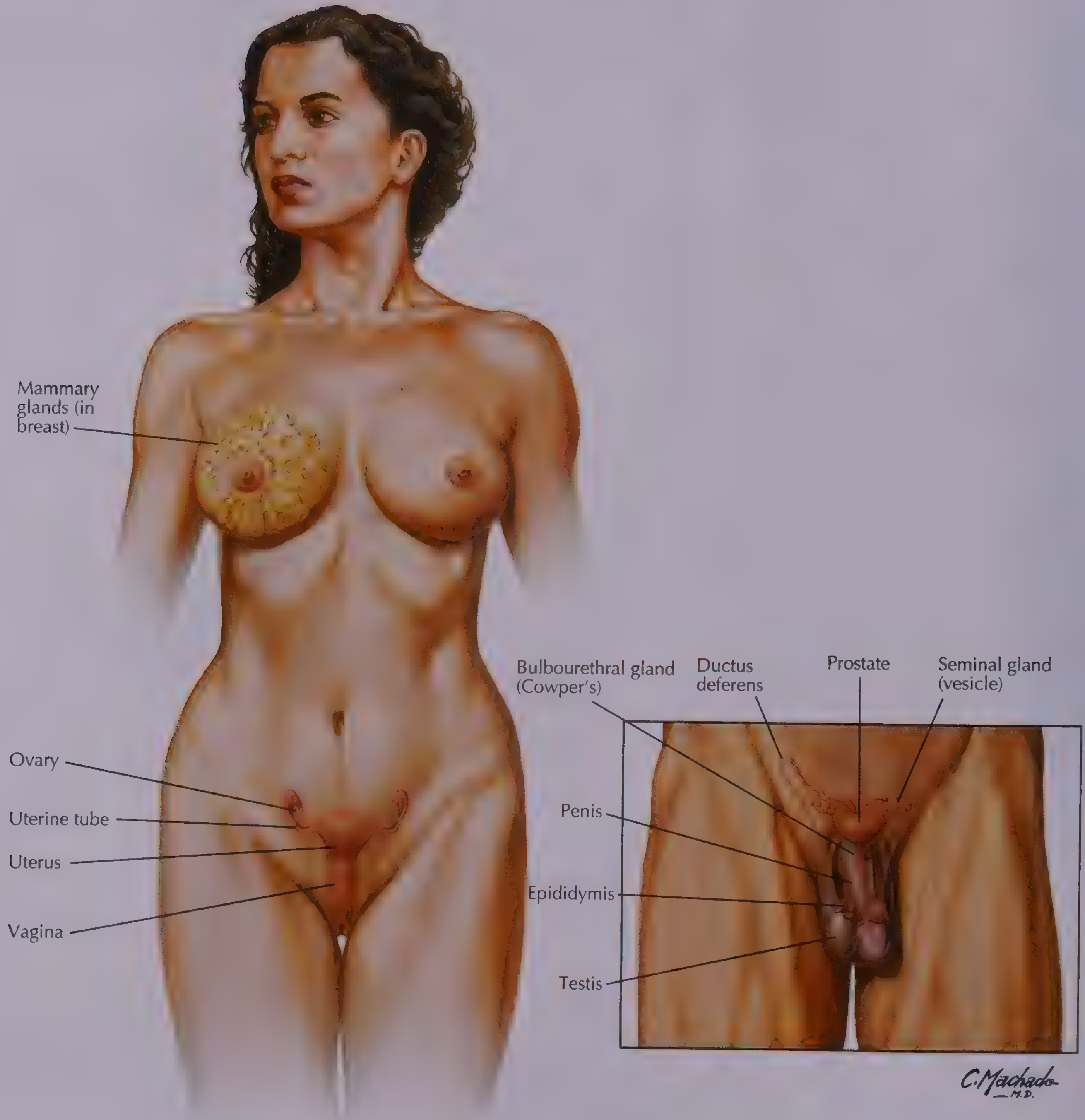

Pituitary gland
Falx cerebri
Pons
Sphenoidal sinus
Supreme nasal concha
Frontal sinus
Superior nasal concha
Medulla oblongata
Nasal cavity
Middle nasal concha
Nasopharynx
Inferior nasal concha
Nasal vestibule
Oropharynx
Pharyngeal opening of auditory tube
Oral cavity
Laryngopharynx
Tongue
Esophagus
Epiglottis
Cervical pleura
Larynx
Clavicle
Vocal fold (cord)
1st rib
Trachea
Costal part of pleura
Subclavian a. and v.
Mediastinal part of pleura
Aortic arch
Right pulmonary a.
Left pulmonary a.
Left main bronchus
Right main bronchus
Descending aorta
Sternum (*cut away*)
Right lung (covered by visceral pleura)
6th costal cartilage
7th costal cartilage
Hilum of right lung
Rectus abdominis m.
Linea alba
Mediastinal part of pleura
Internal abdominal oblique m.
Diaphragmatic part of pleura
External abdominal oblique m. (*cut away*)
Diaphragm
F. Netter M.D.

Overview of Digestive System

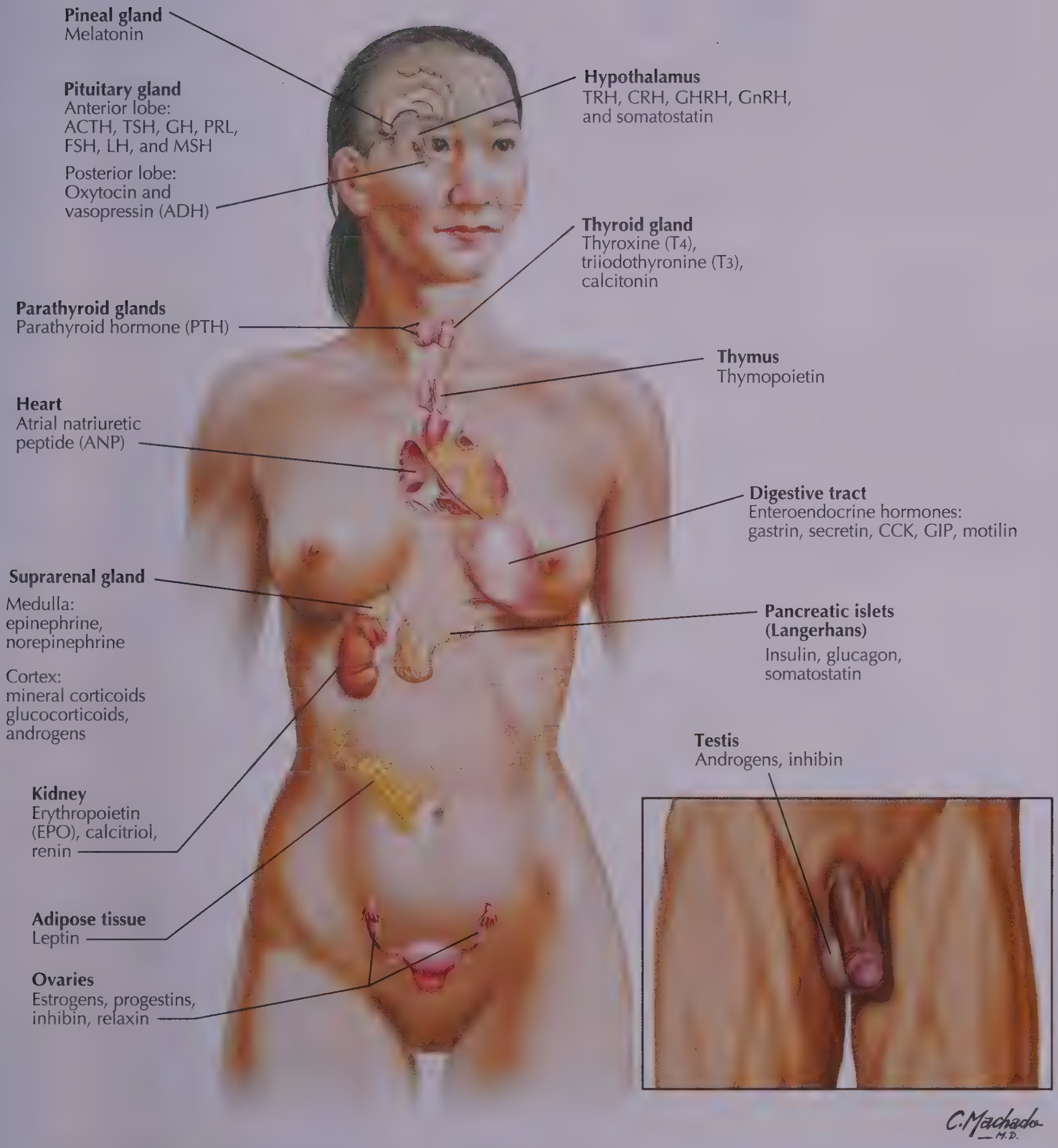

Pharynx
Pharyngeal muscles propel food into esophagus
Liver
Secretion of bile (important for lipid digestion); storage of nutrients; production of cellular fuels, plasma proteins, and clotting factors; detoxification and phagocytosis
Pancreas
Secretion of buffers and digestive enzymes by exocrine cells; secretion of hormones by endocrine cells to regulate digestion
Gallbladder
Concentration and storage of bile
Large intestine
Dehydration and compaction of indigestible materials for elimination; resorption of water and electrolytes; host defense
Oral cavity, teeth, tongue
Mechanical breakdown, mixing with saliva
Salivary glands (sublingual, submandibular, parotid)
Secretion of lubricating fluid containing enzymes that initiate digestion
Esophagus
Transport of food into the stomach
Stomach
Chemical breakdown of food by acid and enzymes; mechanical breakdown via muscular contractions; absorption of water, alcohol, and some minerals
Small intestine
Neutralization of acid from stomach; enzymatic digestion and absorption of water, organic substrates, vitamins, and ions; host defense
C. Machado M.D.


Suprarenal glands
Kidneys
Ureters
Urinary bladder
Urethra
Suprarenal glands
Kidneys
Ureters
Urinary bladder
Urethra
C.Machado M.D.

Overview of Reproductive System


Mammary glands (in breast)
Ovary
Uterine tube
Uterus
Vagina
Bulbourethral gland (Cowper's)
Ductus deferens
Prostate
Seminal gland (vesicle)
Penis
Epididymis
Testis
C. Machado M.D.

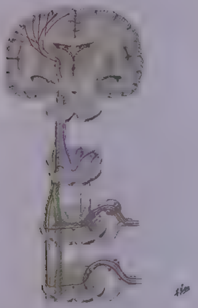
Overview of Endocrine System


Pineal gland
Melatonin
Pituitary gland
Anterior lobe:
ACTH, TSH, GH, PRL, FSH, LH, and MSH
Posterior lobe:
Oxytocin and vasopressin (ADH)
Parathyroid glands
Parathyroid hormone (PTH)
Heart
Atrial natriuretic peptide (ANP)
Suprarenal gland
Medulla:
epinephrine, norepinephrine
Cortex:
mineral corticoids glucocorticoids, androgens
Kidney
Erythropoietin (EPO), calcitriol, renin
Adipose tissue
Leptin
Ovaries
Estrogens, progestins, inhibin, relaxin
Hypothalamus
TRH, CRH, GHRH, GnRH, and somatostatin
Thyroid gland
Thyroxine (T4), triiodothyronine (T3), calcitonin
Thymus
Thymopoietin
Digestive tract
Enteroendocrine hormones:
gastrin, secretin, CCK, GIP, motilin
Pancreatic islets (Langerhans)
Insulin, glucagon, somatostatin
Testis
Androgens, inhibin
C. Machado M.D.

HEAD AND NECK 2

Surface Anatomy 22–24
Bones and Joints 25–47
Neck 48–58
Nose 59–82
Mouth 83–90
Pharynx 91–102
Larynx and Endocrine Glands 103–109
Eye 110–120
Ear 121–126
Brain and Meninges 127–142
Cranial and Cervical Nerves 143–162
Cerebral Vasculature 163–175
Regional Imaging 176–177
Structures with High Clinical Significance Tables 2.1–2.4
Cranial Nerves Tables 2.5–2.8
Branches of Cervical Plexus Table 2.9
Muscles Tables 2.10–2.14
Electronic Bonus Plates BP 14–BP 32

ELECTRONIC BONUS PLATES


BP 14 Somatosensory System: Trunk and Limbs

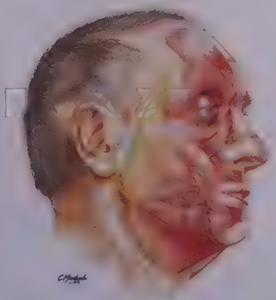
BP 15 Pyramidal System

BP 16 3D Skull Reconstruction CTs

BP 17 Degenerative Changes in Cervical Vertebrae

BP 18 Atlantooccipital Junction

BP 19 Muscles of Facial Expression: Anterior View


BP 20 Musculature of Face

BP 21 Arteries of Nasal Cavity: Bony Nasal Septum Turned Up

ELECTRONIC BONUS PLATES—*cont'd*

BP 22 Nose and Maxillary Sinus: Transverse Section

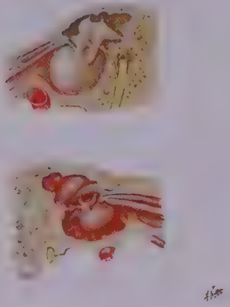
BP 23 Paranasal Sinuses

BP 24 Subclavian Artery

BP 25 Opening of the Mandible

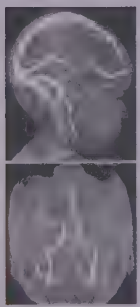
BP 26 Afferent Innervation of Oral Cavity and Pharynx

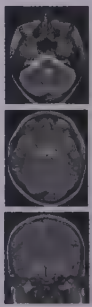
BP 27 Fasciae of Orbit and Eyeball


BP 28 Tympanic Cavity: Medial and Lateral Views

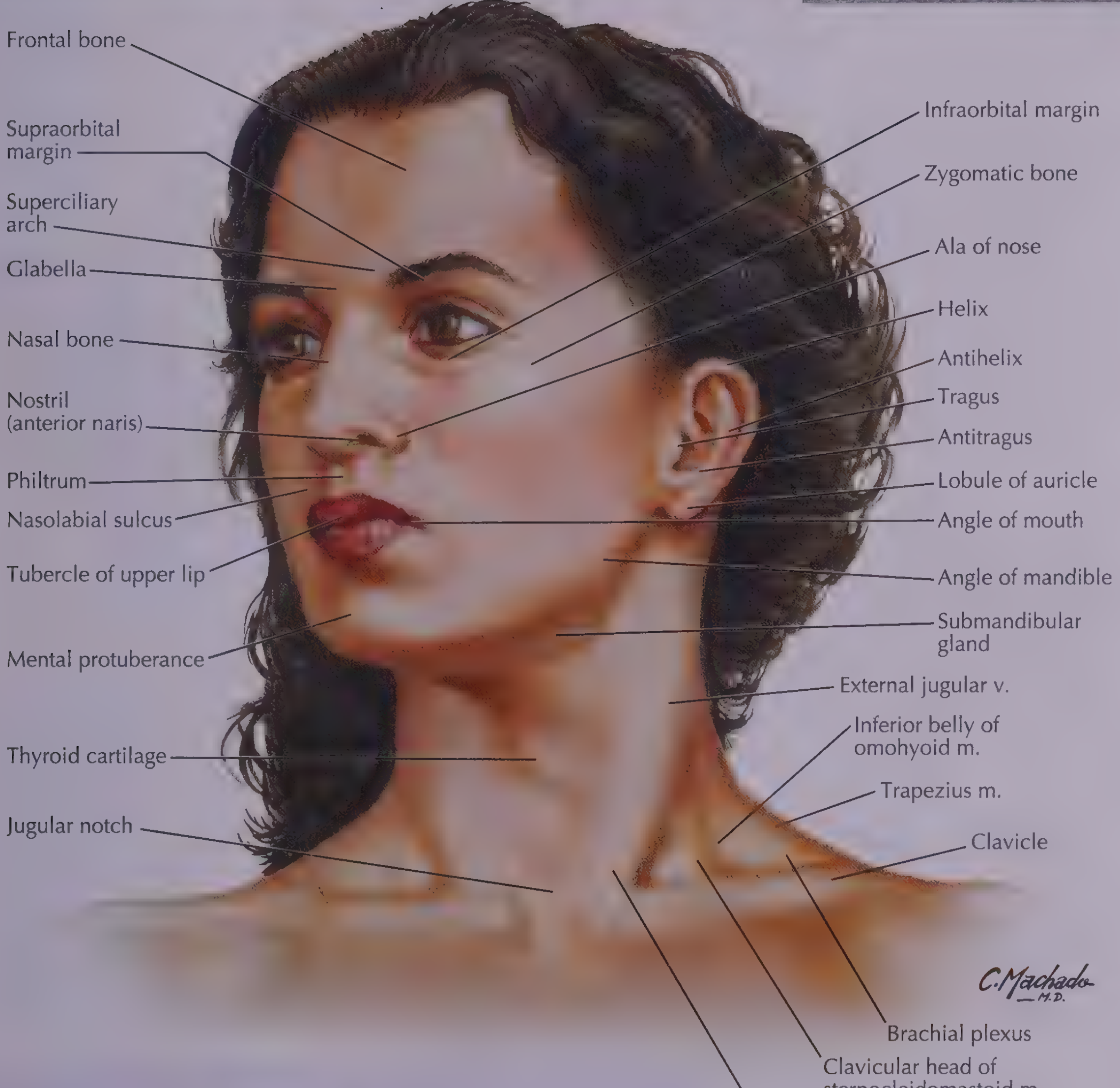
BP 29 Anatomy of the Pediatric Ear

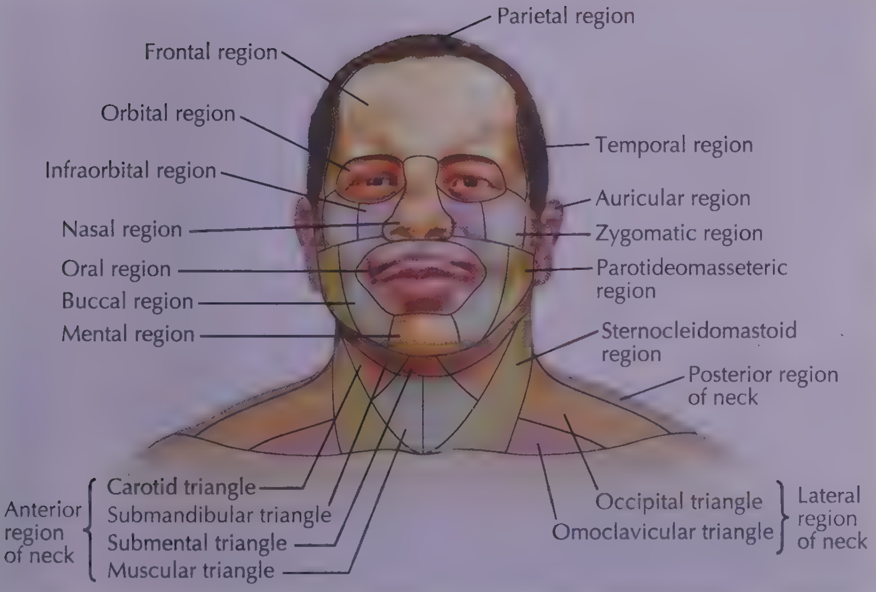
BP 30 Auditory Tube (Eustachian)


BP 31 Cranial Imaging (MRV and MRA)


BP 32 Axial and Coronal MRIs of Brain

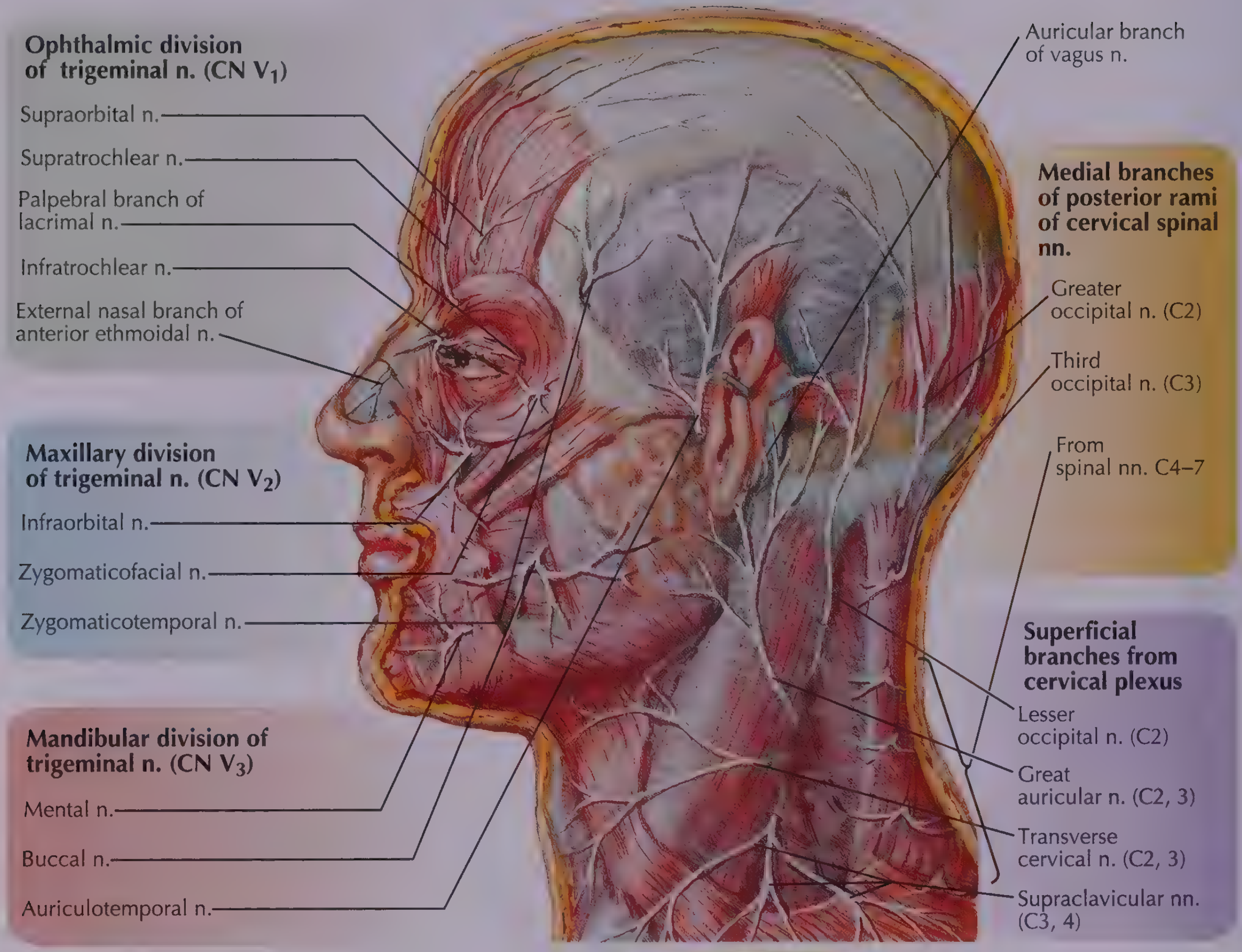
See also Plates 18, 188

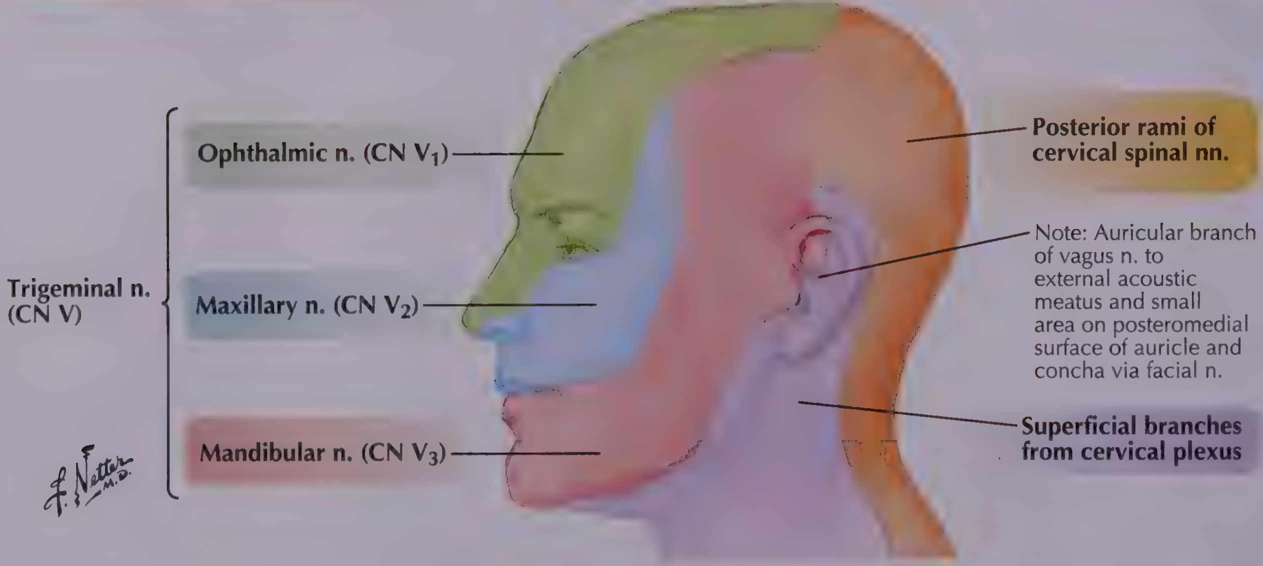

Frontal bone
Supraorbital margin
Superciliary arch
Glabella
Nasal bone
Nostril (anterior naris)
Philtrum
Nasolabial sulcus
Tubercle of upper lip
Mental protuberance
Thyroid cartilage
Jugular notch
Infraorbital margin
Zygomatic bone
Ala of nose
Helix
Antihelix
Tragus
Antitragus
Lobule of auricle
Angle of mouth
Angle of mandible
Submandibular gland
External jugular v.
Inferior belly of omohyoid m.
Trapezius m.
Clavicle
C. Machado M.D.
Brachial plexus
Clavicular head of sternocleidomastoid m.
Sternal head of sternocleidomastoid m.


Parietal region
Frontal region
Orbital region
Infraorbital region
Nasal region
Oral region
Buccal region
Mental region
Temporal region
Auricular region
Zygomatic region
Parotideomasseteric region
Sternocleidomastoid region
Posterior region of neck
Anterior region of neck
Carotid triangle
Submandibular triangle
Submental triangle
Muscular triangle
Occipital triangle
Omoclavicular triangle
Lateral region of neck

Cutaneous Nerves of Head and Neck

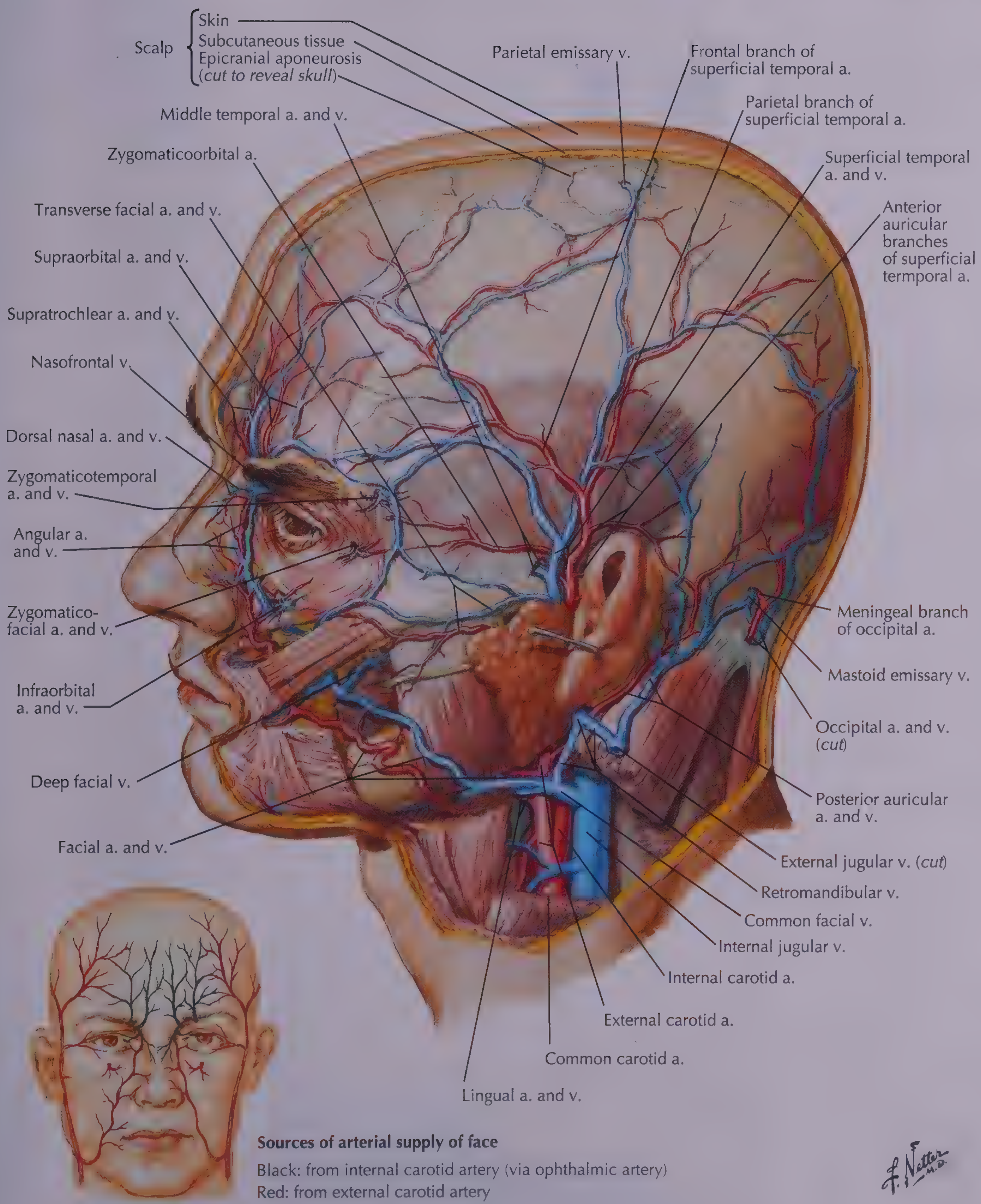
See also Plates 6, 59, 60, 79


Ophthalmic division of trigeminal n. (CN V$_1$)
Supraorbital n.
Supratrochlear n.
Palpebral branch of lacrimal n.
Infratrochlear n.
External nasal branch of anterior ethmoidal n.
Maxillary division of trigeminal n. (CN V$_2$)
Infraorbital n.
Zygomaticofacial n.
Zygomaticotemporal n.
Mandibular division of trigeminal n. (CN V$_3$)
Mental n.
Buccal n.
Auriculotemporal n.
Auricular branch of vagus n.
Medial branches of posterior rami of cervical spinal nn.
Greater occipital n. (C2)
Third occipital n. (C3)
From spinal nn. C4–7
Superficial branches from cervical plexus
Lesser occipital n. (C2)
Great auricular n. (C2, 3)
Transverse cervical n. (C2, 3)
Supraclavicular nn. (C3, 4)


Trigeminal n. (CN V)
Ophthalmic n. (CN V$_1$)
Maxillary n. (CN V$_2$)
Mandibular n. (CN V$_3$)
Posterior rami of cervical spinal nn.
Note: Auricular branch of vagus n. to external acoustic meatus and small area on posteromedial surface of auricle and concha via facial n.
Superficial branches from cervical plexus

Superficial Arteries and Veins of Face and Scalp

See also Plates 74, 99, 100


Scalp
Skin
Subcutaneous tissue
Epicranial aponeurosis (*cut to reveal skull*)
Parietal emissary v.
Frontal branch of superficial temporal a.
Parietal branch of superficial temporal a.
Middle temporal a. and v.
Zygomaticoorbital a.
Superficial temporal a. and v.
Transverse facial a. and v.
Anterior auricular branches of superficial termporal a.
Supraorbital a. and v.
Supratrochlear a. and v.
Nasofrontal v.
Dorsal nasal a. and v.
Zygomaticotemporal a. and v.
Angular a. and v.
Zygomatico-facial a. and v.
Meningeal branch of occipital a.
Mastoid emissary v.
Infraorbital a. and v.
Occipital a. and v. (*cut*)
Deep facial v.
Posterior auricular a. and v.
Facial a. and v.
External jugular v. (*cut*)
Retromandibular v.
Common facial v.
Internal jugular v.
Internal carotid a.
External carotid a.
Common carotid a.
Lingual a. and v.
F. Netter M.D.

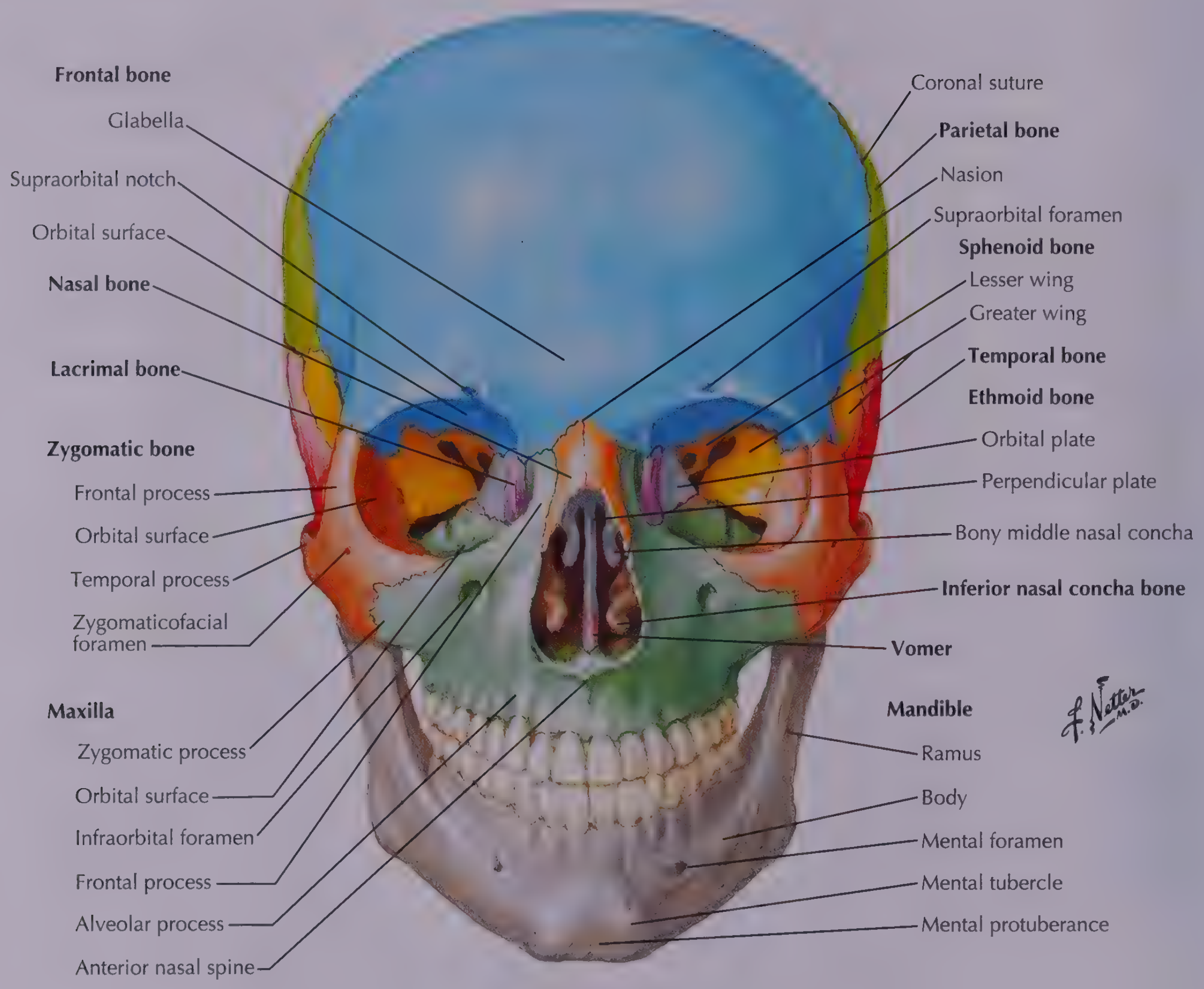
Sources of arterial supply of face

Black: from internal carotid artery (via ophthalmic artery)

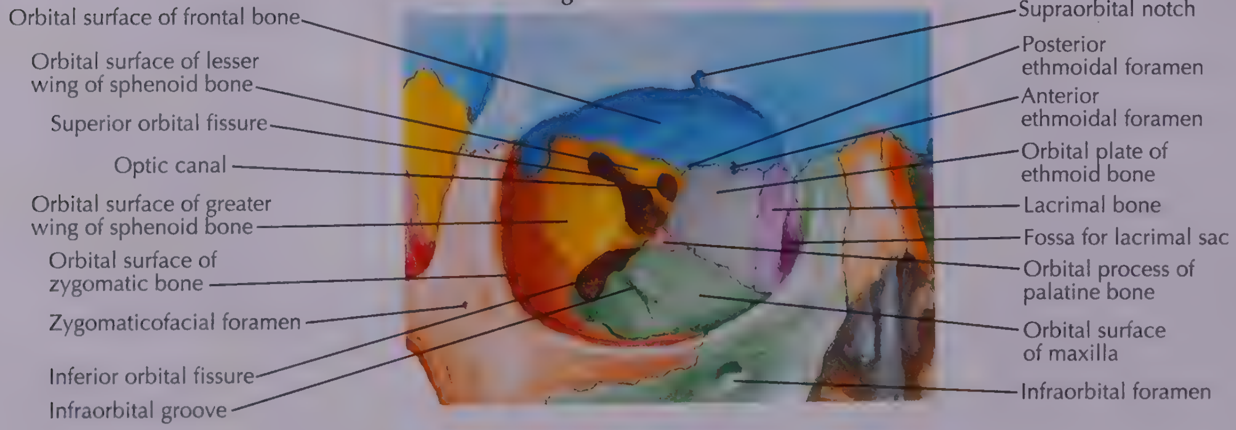
Red: from external carotid artery

Skull: Anterior View

See also Plate 27

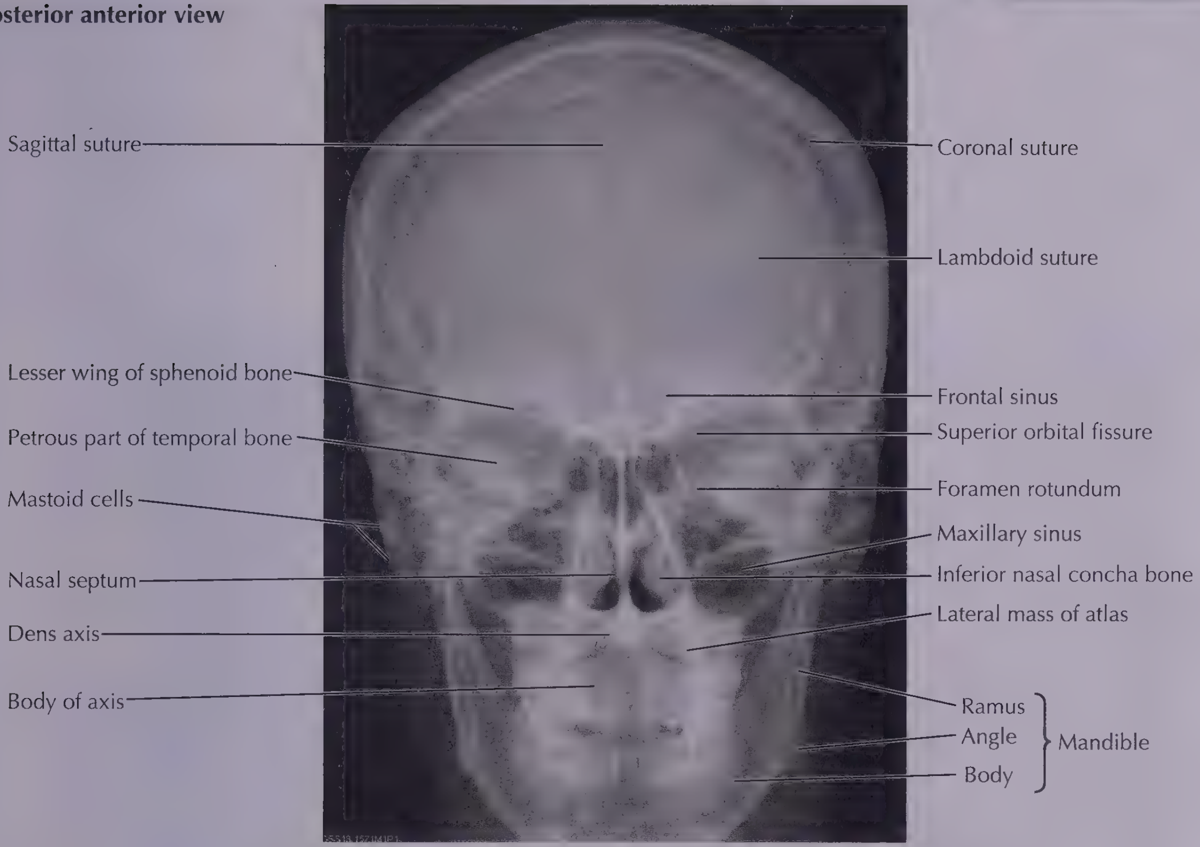

Frontal bone
Glabella
Supraorbital notch
Orbital surface
Nasal bone
Lacrimal bone
Zygomatic bone
Frontal process
Orbital surface
Temporal process
Zygomaticofacial foramen
Maxilla
Zygomatic process
Orbital surface
Infraorbital foramen
Frontal process
Alveolar process
Anterior nasal spine
Coronal suture
Parietal bone
Nasion
Supraorbital foramen
Sphenoid bone
Lesser wing
Greater wing
Temporal bone
Ethmoid bone
Orbital plate
Perpendicular plate
Bony middle nasal concha
Inferior nasal concha bone
Vomer
Mandible
Ramus
Body
Mental foramen
Mental tubercle
Mental protuberance

Right orbit: frontal view

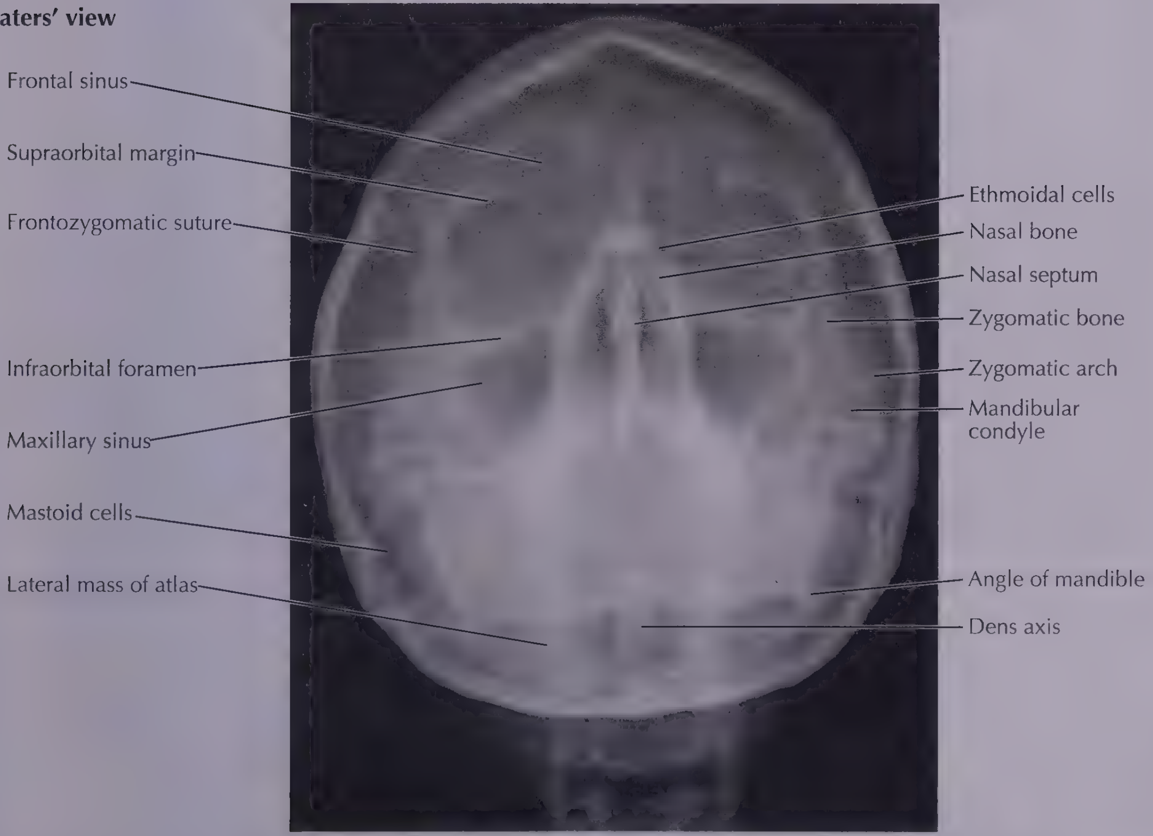

Orbital surface of frontal bone
Orbital surface of lesser wing of sphenoid bone
Superior orbital fissure
Optic canal
Orbital surface of greater wing of sphenoid bone
Orbital surface of zygomatic bone
Zygomaticofacial foramen
Inferior orbital fissure
Infraorbital groove
Supraorbital notch
Posterior ethmoidal foramen
Anterior ethmoidal foramen
Orbital plate of ethmoid bone
Lacrimal bone
Fossa for lacrimal sac
Orbital process of palatine bone
Orbital surface of maxilla
Infraorbital foramen

See also Plate 25

Posterior anterior view

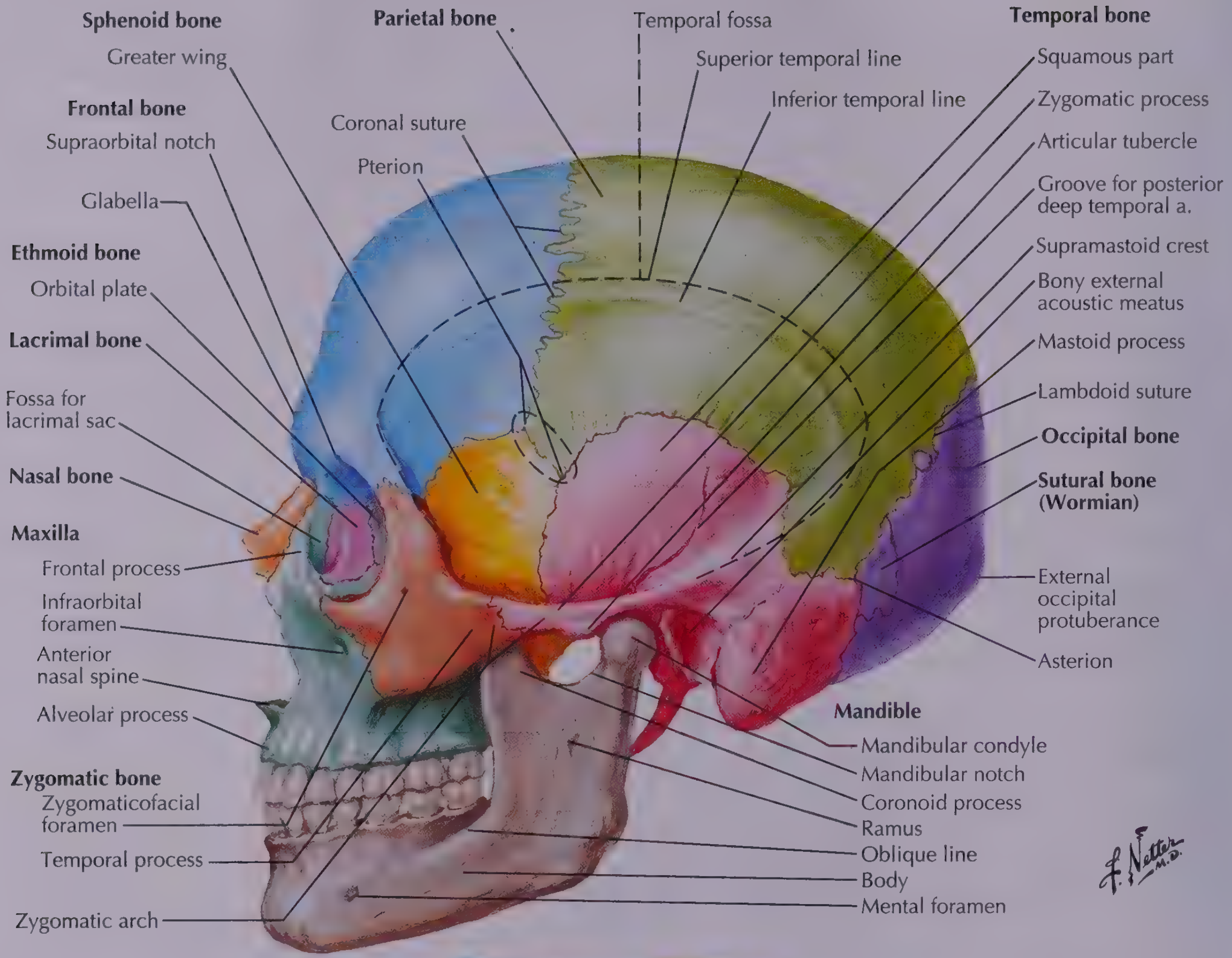

Sagittal suture
Coronal suture
Lambdoid suture
Lesser wing of sphenoid bone
Petrous part of temporal bone
Mastoid cells
Nasal septum
Dens axis
Body of axis
Frontal sinus
Superior orbital fissure
Foramen rotundum
Maxillary sinus
Inferior nasal concha bone
Lateral mass of atlas
Ramus
Angle
Body
Mandible

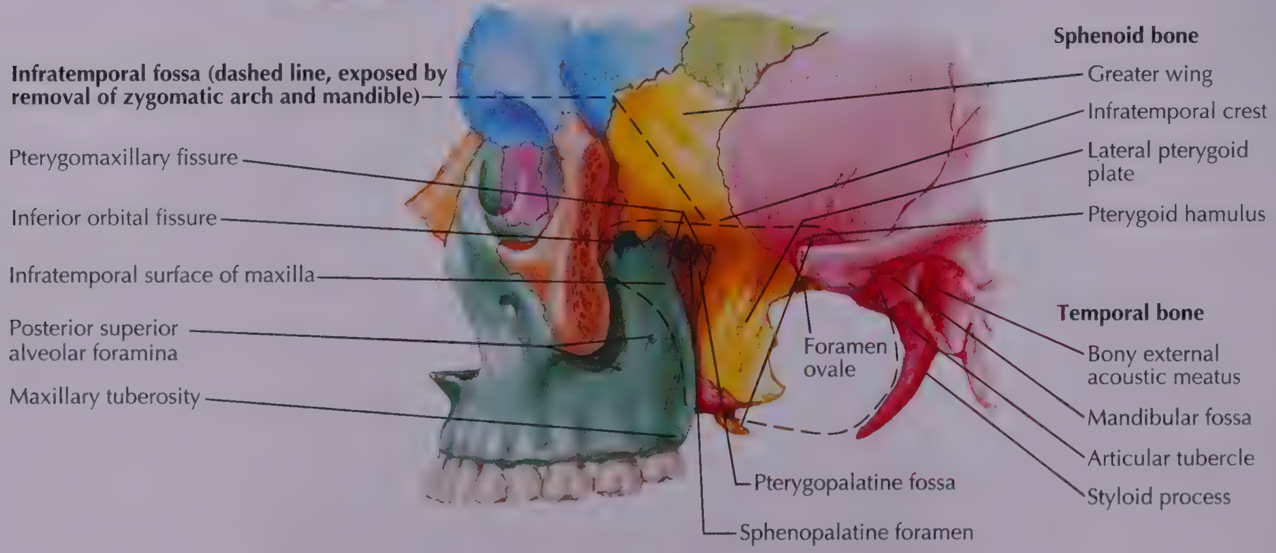
Waters' view


Frontal sinus
Supraorbital margin
Frontozygomatic suture
Infraorbital foramen
Maxillary sinus
Mastoid cells
Lateral mass of atlas
Ethmoidal cells
Nasal bone
Nasal septum
Zygomatic bone
Zygomatic arch
Mandibular condyle
Angle of mandible
Dens axis

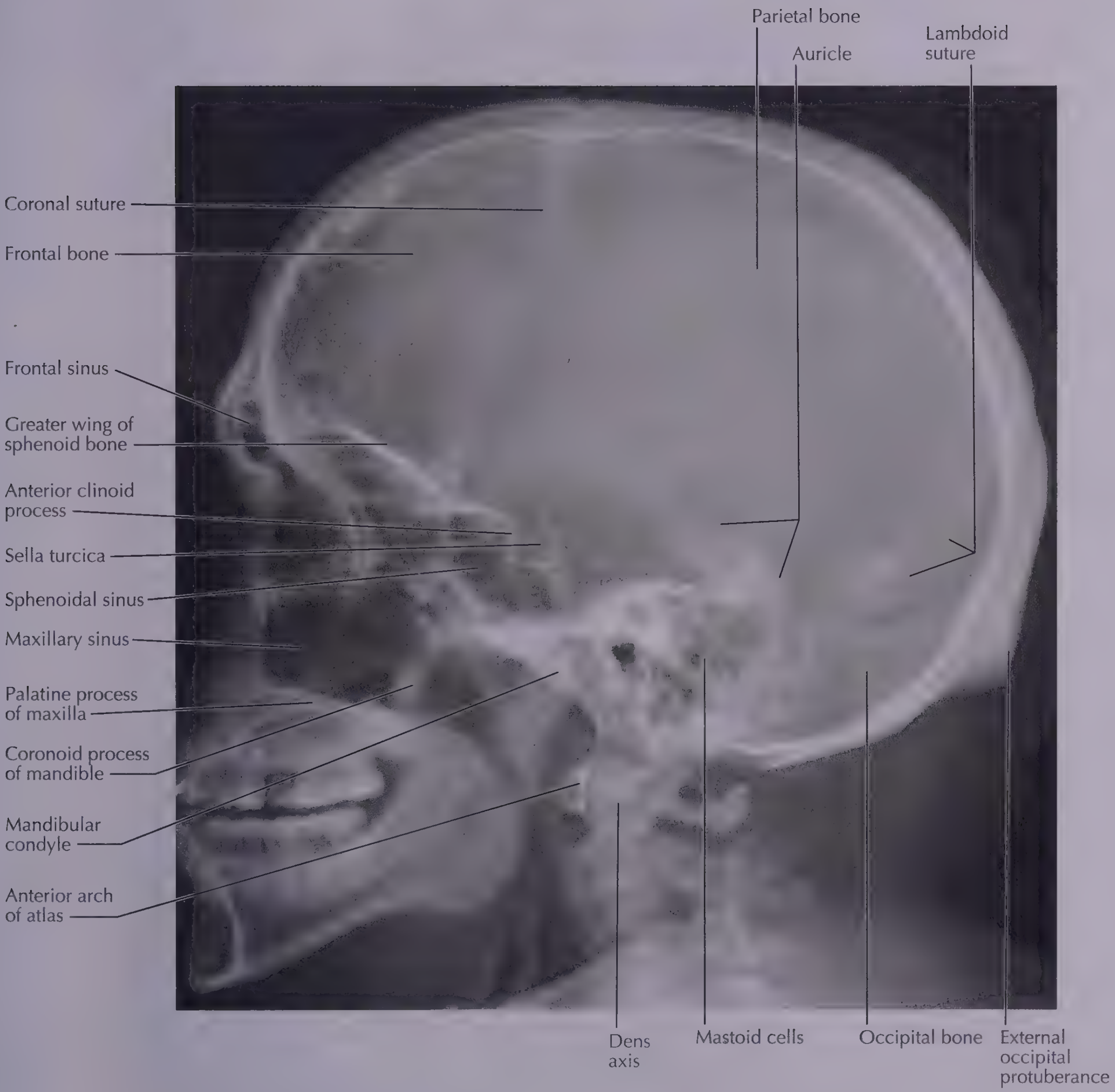
Skull: Lateral View

See also Plates 28, 29, 36

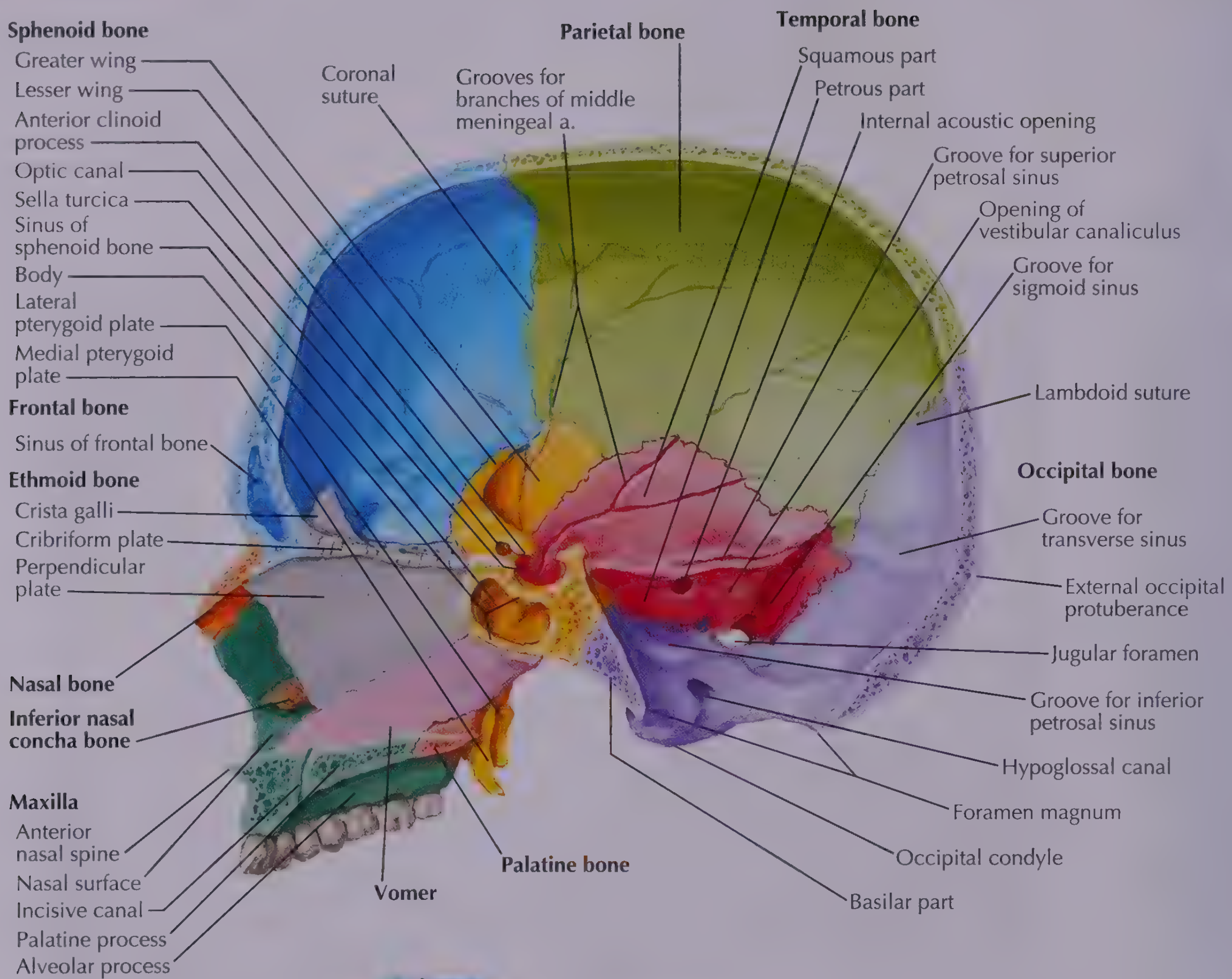

Sphenoid bone
Greater wing
Frontal bone
Supraorbital notch
Glabella
Ethmoid bone
Orbital plate
Lacrimal bone
Fossa for lacrimal sac
Nasal bone
Maxilla
Frontal process
Infraorbital foramen
Anterior nasal spine
Alveolar process
Zygomatic bone
Zygomaticofacial foramen
Temporal process
Zygomatic arch
Parietal bone
Coronal suture
Pterion
Temporal fossa
Superior temporal line
Inferior temporal line
Temporal bone
Squamous part
Zygomatic process
Articular tubercle
Groove for posterior deep temporal a.
Supramastoid crest
Bony external acoustic meatus
Mastoid process
Lambdoid suture
Occipital bone
Sutural bone (Wormian)
External occipital protuberance
Asterion
Mandible
Mandibular condyle
Mandibular notch
Coronoid process
Ramus
Oblique line
Body
Mental foramen
F. Netter M.D.

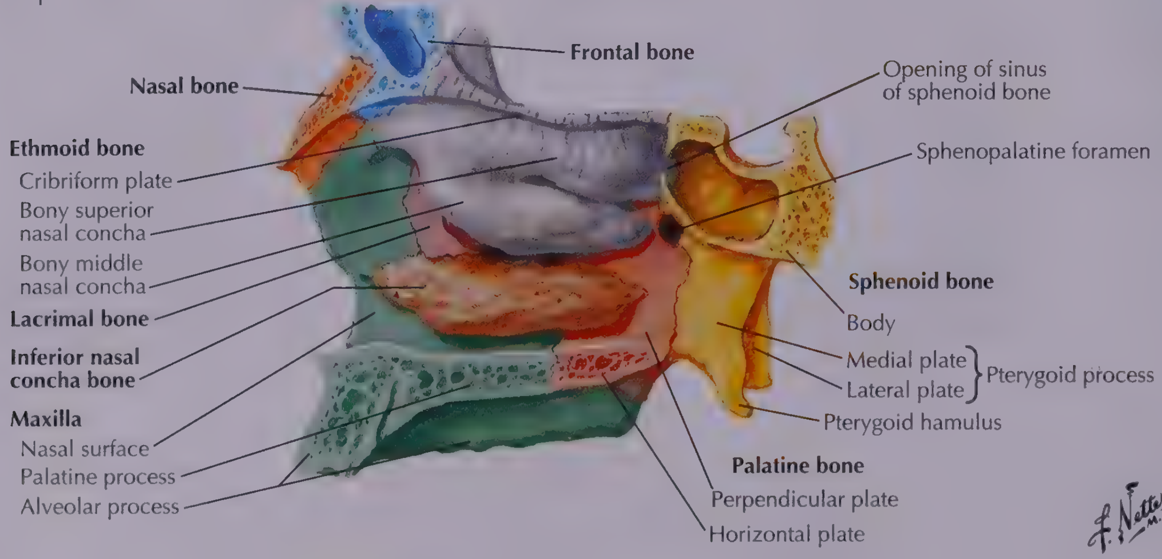

Infratemporal fossa (dashed line, exposed by removal of zygomatic arch and mandible)
Pterygomaxillary fissure
Inferior orbital fissure
Infratemporal surface of maxilla
Posterior superior alveolar foramina
Maxillary tuberosity
Foramen ovale
Pterygopalatine fossa
Sphenopalatine foramen
Sphenoid bone
Greater wing
Infratemporal crest
Lateral pterygoid plate
Pterygoid hamulus
Temporal bone
Bony external acoustic meatus
Mandibular fossa
Articular tubercle
Styloid process

See also Plates 29, BP 35


Parietal bone
Auricle
Lambdoid suture
Coronal suture
Frontal bone
Frontal sinus
Greater wing of sphenoid bone
Anterior clinoid process
Sella turcica
Sphenoidal sinus
Maxillary sinus
Palatine process of maxilla
Coronoid process of mandible
Mandibular condyle
Anterior arch of atlas
Dens axis
Mastoid cells
Occipital bone
External occipital protuberance

See also Plates 17, 64

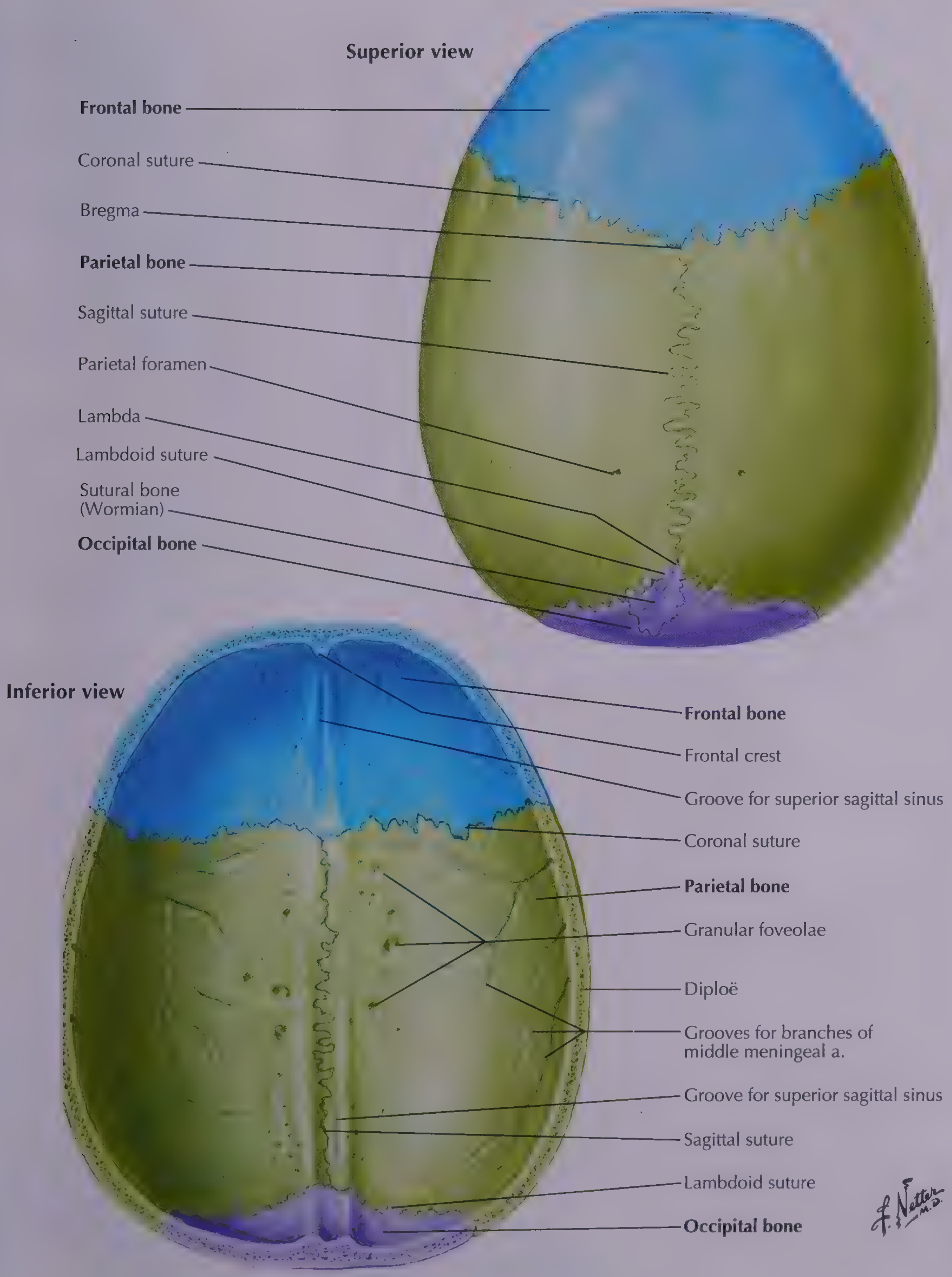

Sphenoid bone
Greater wing
Lesser wing
Anterior clinoid process
Optic canal
Sella turcica
Sinus of sphenoid bone
Body
Lateral pterygoid plate
Medial pterygoid plate
Frontal bone
Sinus of frontal bone
Ethmoid bone
Crista galli
Cribriform plate
Perpendicular plate
Nasal bone
Inferior nasal concha bone
Maxilla
Anterior nasal spine
Nasal surface
Incisive canal
Palatine process
Alveolar process
Coronal suture
Grooves for branches of middle meningeal a.
Parietal bone
Temporal bone
Squamous part
Petrous part
Internal acoustic opening
Groove for superior petrosal sinus
Opening of vestibular canaliculus
Groove for sigmoid sinus
Lambdoid suture
Occipital bone
Groove for transverse sinus
External occipital protuberance
Jugular foramen
Groove for inferior petrosal sinus
Hypoglossal canal
Foramen magnum
Occipital condyle
Basilar part
Vomer
Palatine bone


Frontal bone
Nasal bone
Ethmoid bone
Cribriform plate
Bony superior nasal concha
Bony middle nasal concha
Lacrimal bone
Inferior nasal concha bone
Maxilla
Nasal surface
Palatine process
Alveolar process
Opening of sinus of sphenoid bone
Sphenopalatine foramen
Sphenoid bone
Body
Medial plate
Lateral plate
Pterygoid process
Pterygoid hamulus
Palatine bone
Perpendicular plate
Horizontal plate

View of lateral nasal wall with nasal septum removed

Calvaria

See also Plates 127, 128



Superior view

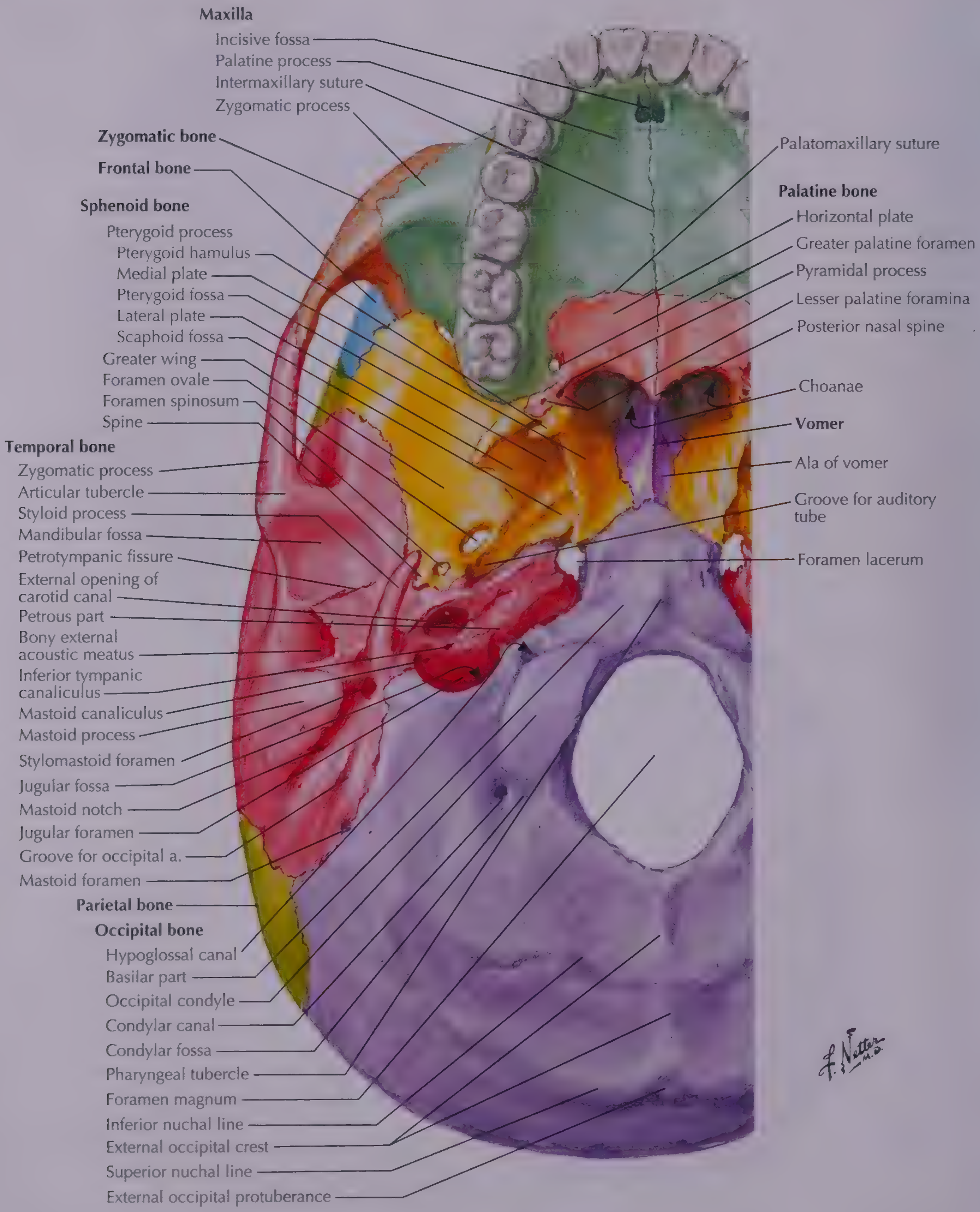
Frontal bone
Coronal suture
Bregma
Parietal bone
Sagittal suture
Parietal foramen
Lambda
Lambdoid suture
Sutural bone (Wormian)
Occipital bone

Inferior view

Frontal bone
Frontal crest
Groove for superior sagittal sinus
Coronal suture
Parietal bone
Granular foveolae
Diploë
Grooves for branches of middle meningeal a.
Groove for superior sagittal sinus
Sagittal suture
Lambdoid suture
Occipital bone

Cranial Base: Inferior View

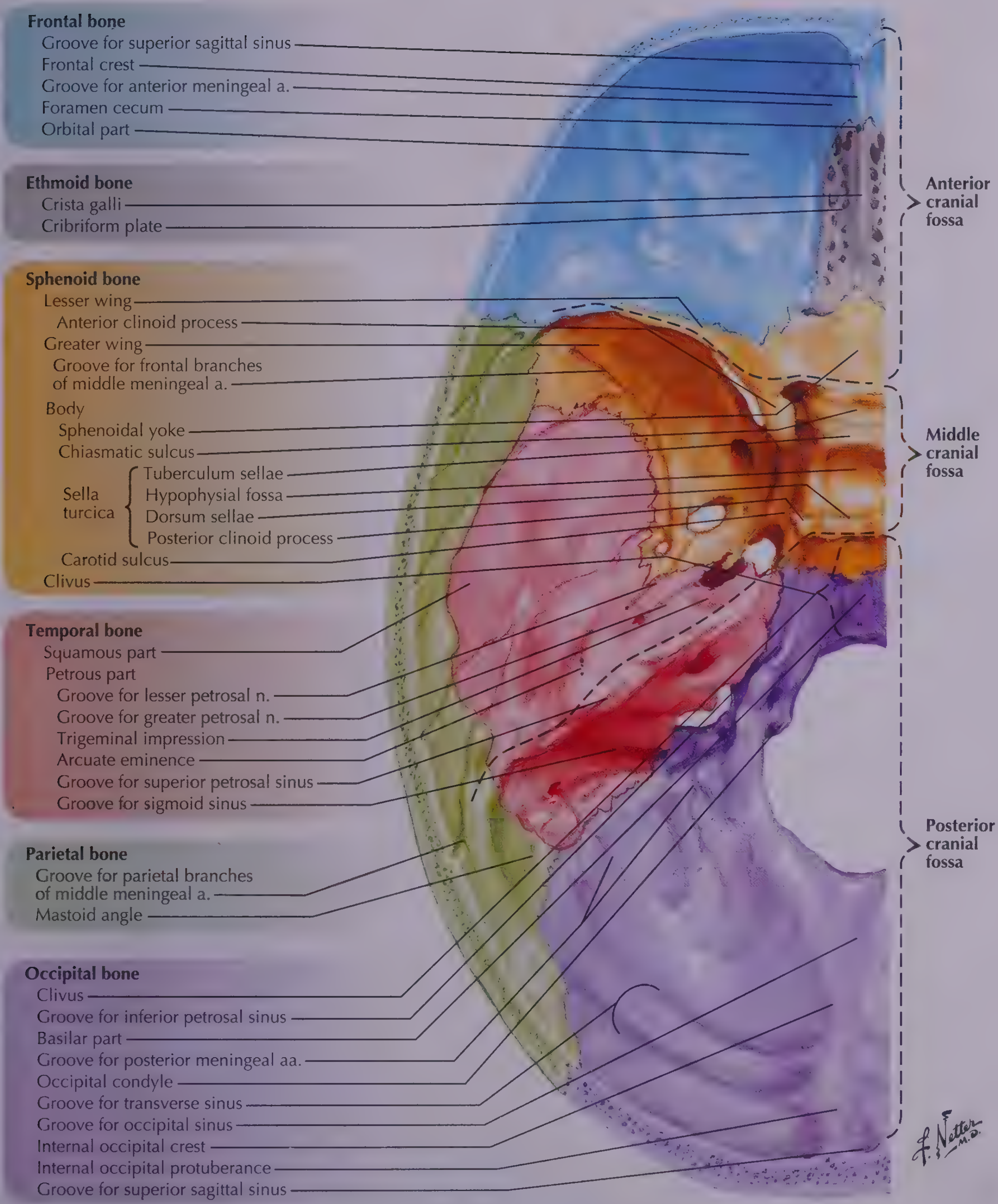
See also Plate 11



Maxilla
Incisive fossa
Palatine process
Intermaxillary suture
Zygomatic process
Zygomatic bone
Frontal bone
Sphenoid bone
Pterygoid process
Pterygoid hamulus
Medial plate
Pterygoid fossa
Lateral plate
Scaphoid fossa
Greater wing
Foramen ovale
Foramen spinosum
Spine
Temporal bone
Zygomatic process
Articular tubercle
Styloid process
Mandibular fossa
Petrotympanic fissure
External opening of carotid canal
Petrous part
Bony external acoustic meatus
Inferior tympanic canaliculus
Mastoid canaliculus
Mastoid process
Stylomastoid foramen
Jugular fossa
Mastoid notch
Jugular foramen
Groove for occipital a.
Mastoid foramen
Parietal bone
Occipital bone
Hypoglossal canal
Basilar part
Occipital condyle
Condylar canal
Condylar fossa
Pharyngeal tubercle
Foramen magnum
Inferior nuchal line
External occipital crest
Superior nuchal line
External occipital protuberance
Palatomaxillary suture
Palatine bone
Horizontal plate
Greater palatine foramen
Pyramidal process
Lesser palatine foramina
Posterior nasal spine
Choanae
Vomer
Ala of vomer
Groove for auditory tube
Foramen lacerum
F. Netter M.D.

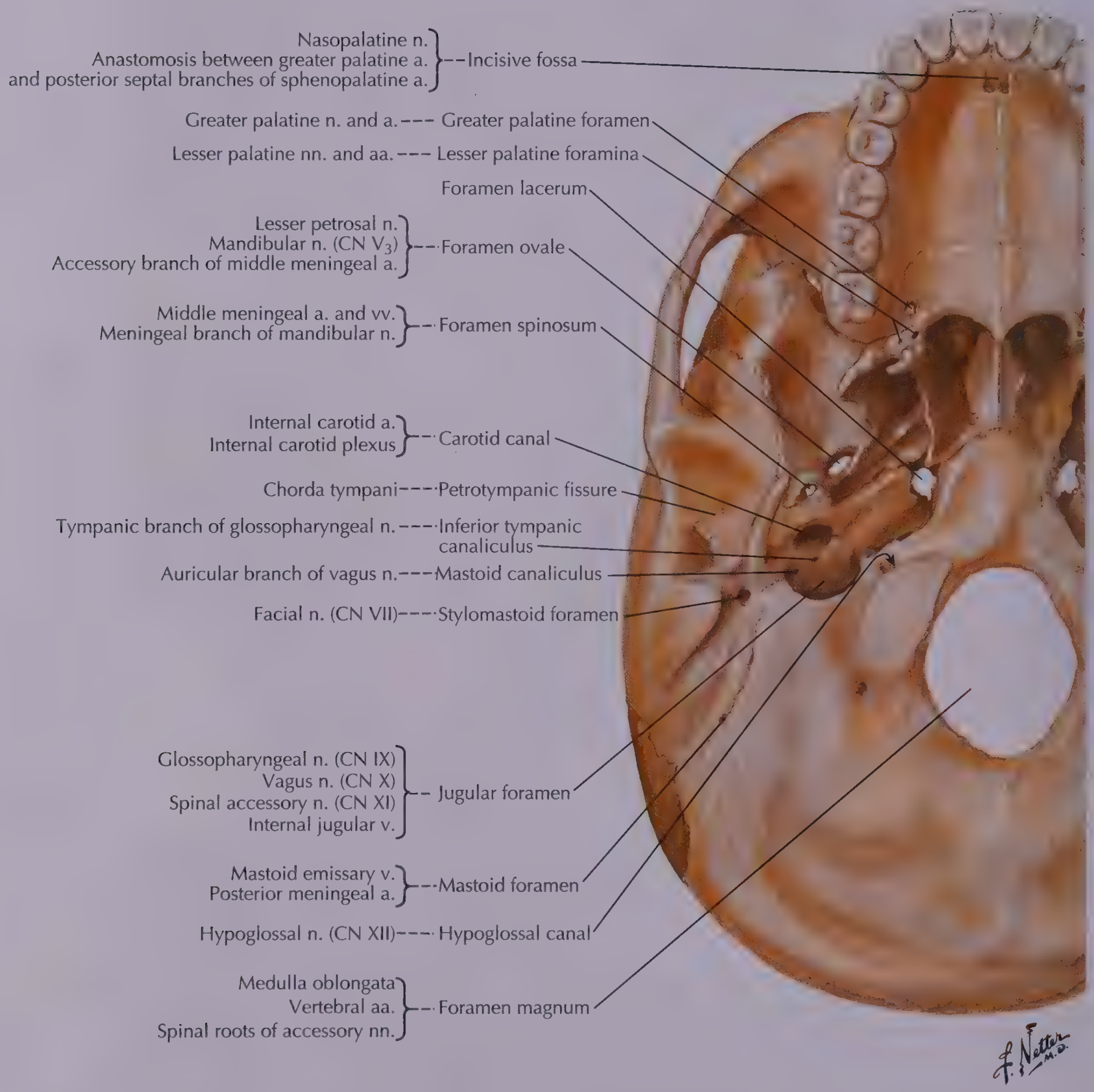
Cranial Base: Superior View

See also Plates 34, 131


Frontal bone
Groove for superior sagittal sinus
Frontal crest
Groove for anterior meningeal a.
Foramen cecum
Orbital part
Ethmoid bone
Crista galli
Cribriform plate
Sphenoid bone
Lesser wing
Anterior clinoid process
Greater wing
Groove for frontal branches of middle meningeal a.
Body
Sphenoidal yoke
Chiasmatic sulcus
Sella turcica
Tuberculum sellae
Hypophysial fossa
Dorsum sellae
Posterior clinoid process
Carotid sulcus
Clivus
Temporal bone
Squamous part
Petrous part
Groove for lesser petrosal n.
Groove for greater petrosal n.
Trigeminal impression
Arcuate eminence
Groove for superior petrosal sinus
Groove for sigmoid sinus
Parietal bone
Groove for parietal branches of middle meningeal a.
Mastoid angle
Occipital bone
Clivus
Groove for inferior petrosal sinus
Basilar part
Groove for posterior meningeal aa.
Occipital condyle
Groove for transverse sinus
Groove for occipital sinus
Internal occipital crest
Internal occipital protuberance
Groove for superior sagittal sinus
Anterior cranial fossa
Middle cranial fossa
Posterior cranial fossa

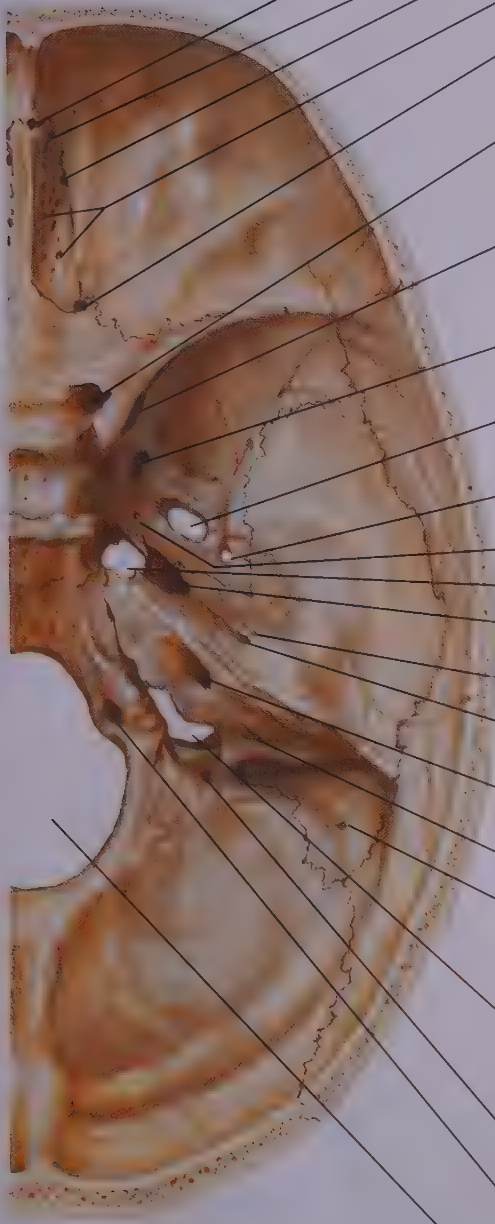
Foramina and Canals of Cranial Base: Inferior View

See also Plate 31


Nasopalatine n.
Anastomosis between greater palatine a. and posterior septal branches of sphenopalatine a.
Incisive fossa
Greater palatine n. and a.
Greater palatine foramen
Lesser palatine nn. and aa.
Lesser palatine foramina
Foramen lacerum
Lesser petrosal n.
Mandibular n. (CN V$_3$)
Accessory branch of middle meningeal a.
Foramen ovale
Middle meningeal a. and vv.
Meningeal branch of mandibular n.
Foramen spinosum
Internal carotid a.
Internal carotid plexus
Carotid canal
Chorda tympani
Petrotympanic fissure
Tympanic branch of glossopharyngeal n.
Inferior tympanic canaliculus
Auricular branch of vagus n.
Mastoid canaliculus
Facial n. (CN VII)
Stylomastoid foramen
Glossopharyngeal n. (CN IX)
Vagus n. (CN X)
Spinal accessory n. (CN XI)
Internal jugular v.
Jugular foramen
Mastoid emissary v.
Posterior meningeal a.
Mastoid foramen
Hypoglossal n. (CN XII)
Hypoglossal canal
Medulla oblongata
Vertebral aa.
Spinal roots of accessory nn.
Foramen magnum
F. Netter M.D.

Foramina and Canals of Cranial Base: Superior View

See also Plates 32, 131



Foramen cecum of frontal bone	Emissary v. to superior sagittal sinus
Nasal fissure Anterior ethmoidal foramen	Anterior ethmoidal a. and v. Anterior ethmoidal n.
Cribriform foramina	Olfactory n. (CN I)
Posterior ethmoidal foramen	Posterior ethmoidal a. and v. Posterior ethmoidal n.
Optic canal	Optic n. (CN II) Ophthalmic a.
Superior orbital fissure	Oculomotor n. (CN III) Trochlear n. (CN IV) Ophthalmic n. (CN V_1) Abducens n. (CN VI) Superior ophthalmic v.
Foramen rotundum	Maxillary n. (CN V_2)
Foramen ovale	Mandibular n. (CN V_3) Accessory branch of middle meningeal a. Lesser petrosal n.
Foramen spinosum	Middle meningeal a. and vv. Meningeal branch of mandibular n.
Sphenoidal emissary foramen (of Vesalius) (inconstant)	Emissary v.
Foramen lacerum	
Carotid canal	Internal carotid a. Internal carotid plexus
Hiatus for	Lesser petrosal n.
Hiatus for	Greater petrosal n.
Internal acoustic meatus	Facial n. (CN VII) Vestibulocochlear n. (CN VIII) Labyrinthine a.
Vestibular canaliculus	Endolymphatic duct
Mastoid foramen	Mastoid emissary v.
Jugular foramen	Inferior petrosal sinus Glossopharyngeal n. (CN IX) Vagus n. (CN X) Spinal accessory n. (CN XI) Sigmoid sinus Posterior meningeal a.
Condylar canal	Condylar emissary v. Meningeal branch of ascending pharyngeal a.
Hypoglossal canal	Hypoglossal n. (CN XII)
Foramen magnum	Medulla oblongata Vertebral aa. Meningeal branches of vertebral aa. Spinal roots of accessory nn.

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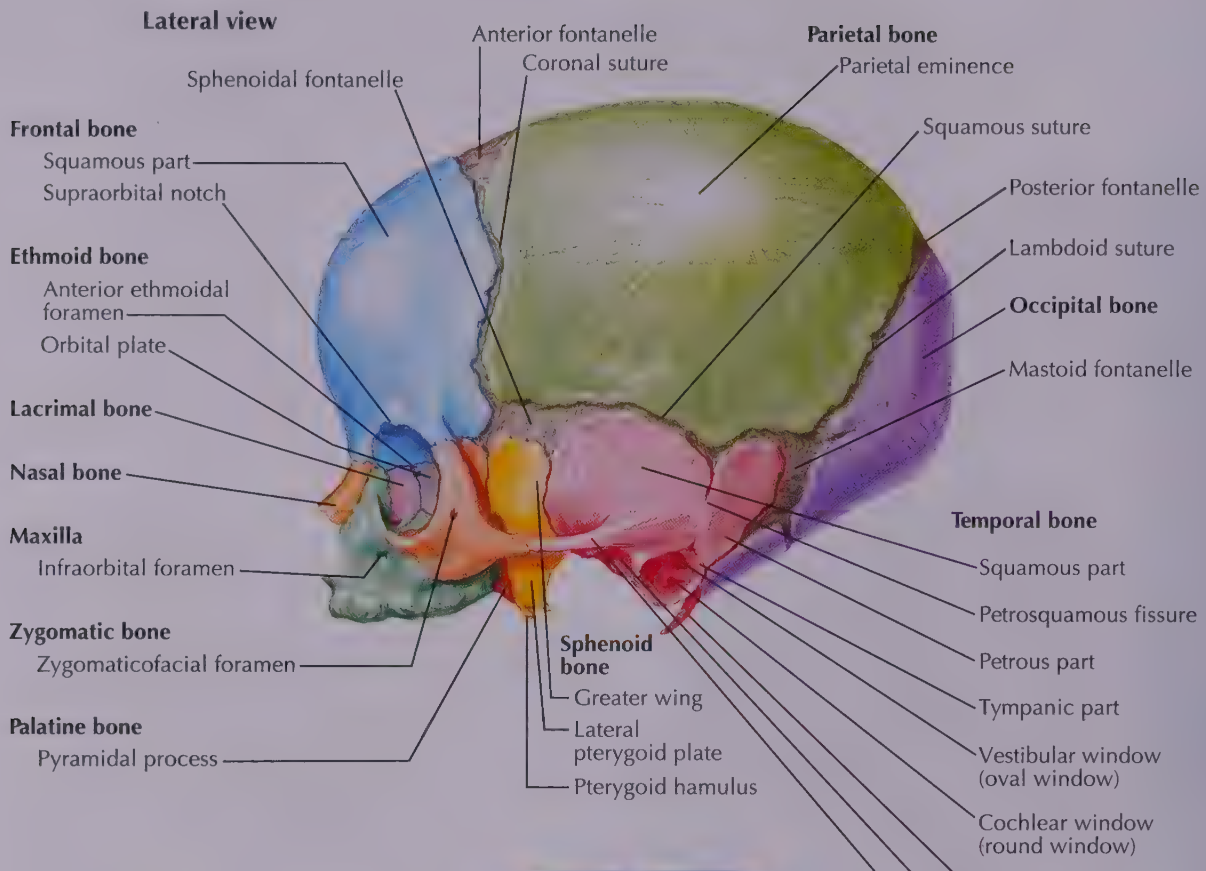
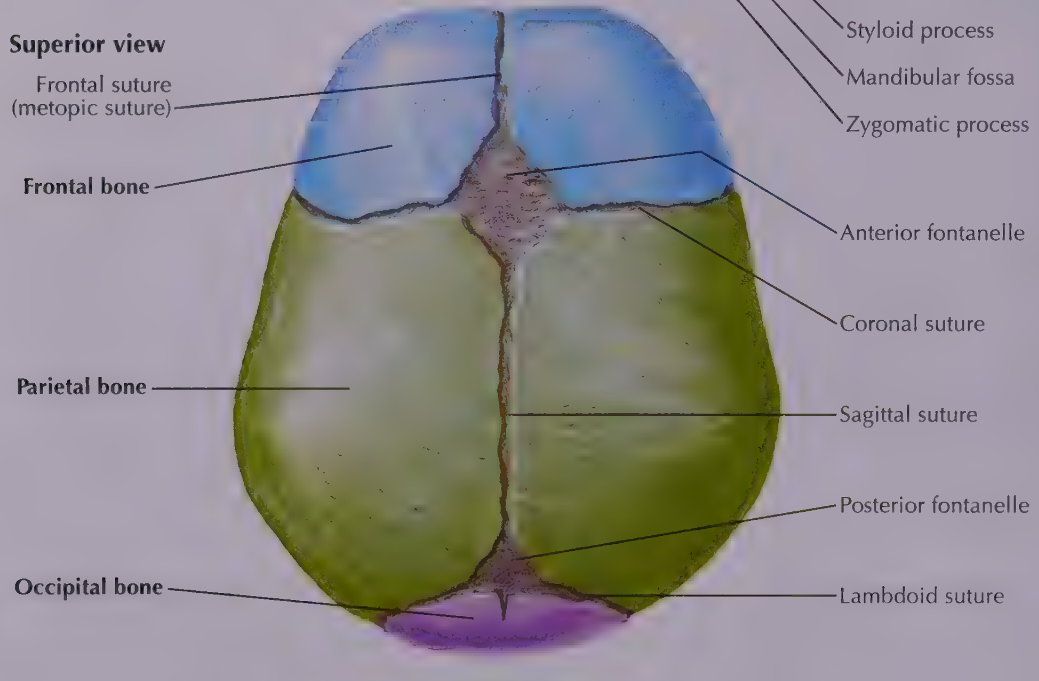
Cranium of Newborn

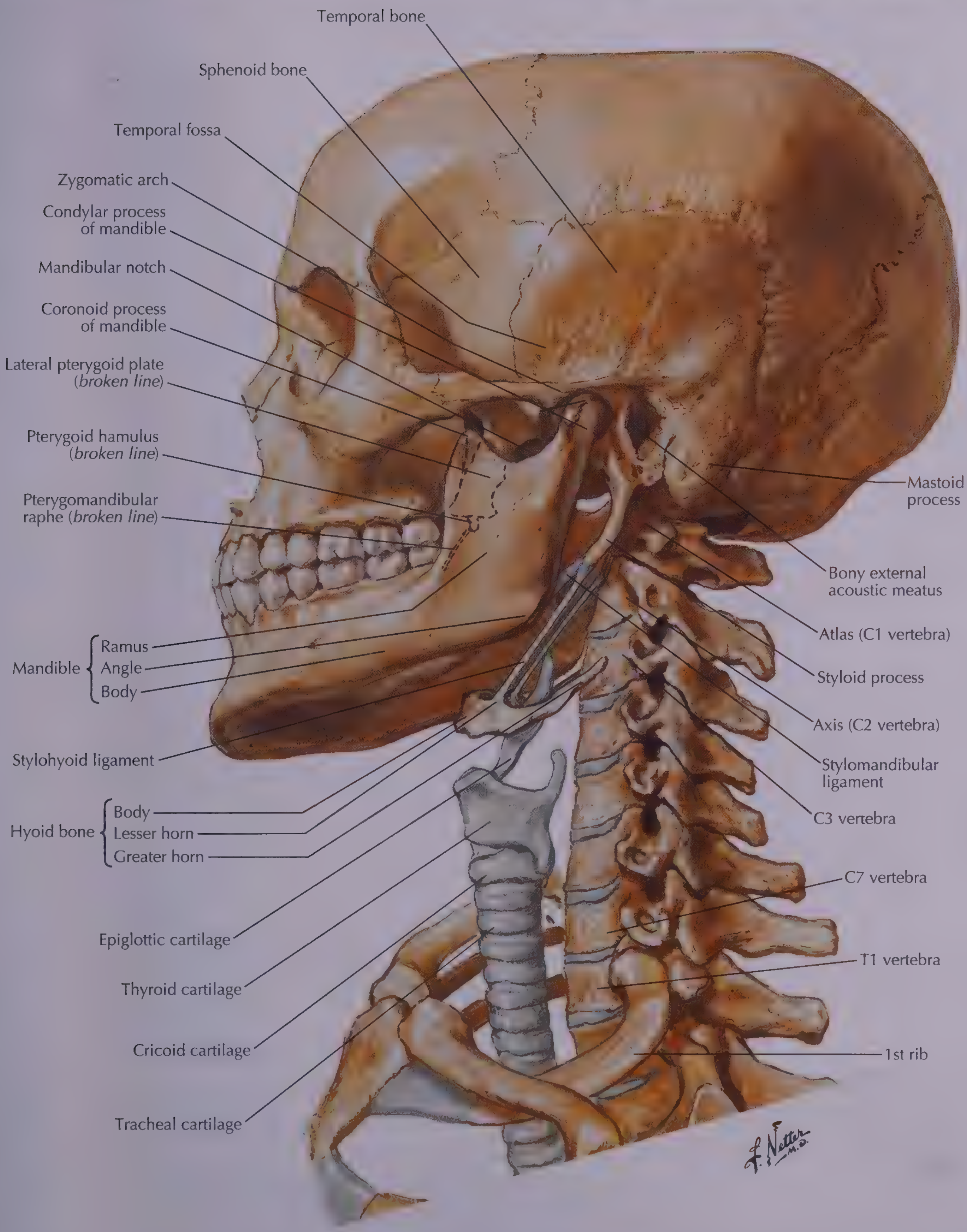
See also Plates 27, 30, BP 16

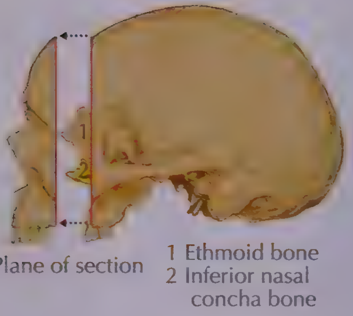

Lateral view
Anterior fontanelle
Coronal suture
Parietal bone
Parietal eminence
Sphenoidal fontanelle
Squamous suture
Frontal bone
Squamous part
Supraorbital notch
Posterior fontanelle
Lambdoid suture
Ethmoid bone
Anterior ethmoidal foramen
Orbital plate
Occipital bone
Mastoid fontanelle
Lacrimal bone
Nasal bone
Temporal bone
Maxilla
Infraorbital foramen
Squamous part
Petrosquamous fissure
Zygomatic bone
Zygomaticofacial foramen
Sphenoid bone
Greater wing
Petrous part
Tympanic part
Palatine bone
Pyramidal process
Lateral pterygoid plate
Pterygoid hamulus
Vestibular window (oval window)
Cochlear window (round window)
Styloid process
Mandibular fossa
Zygomatic process

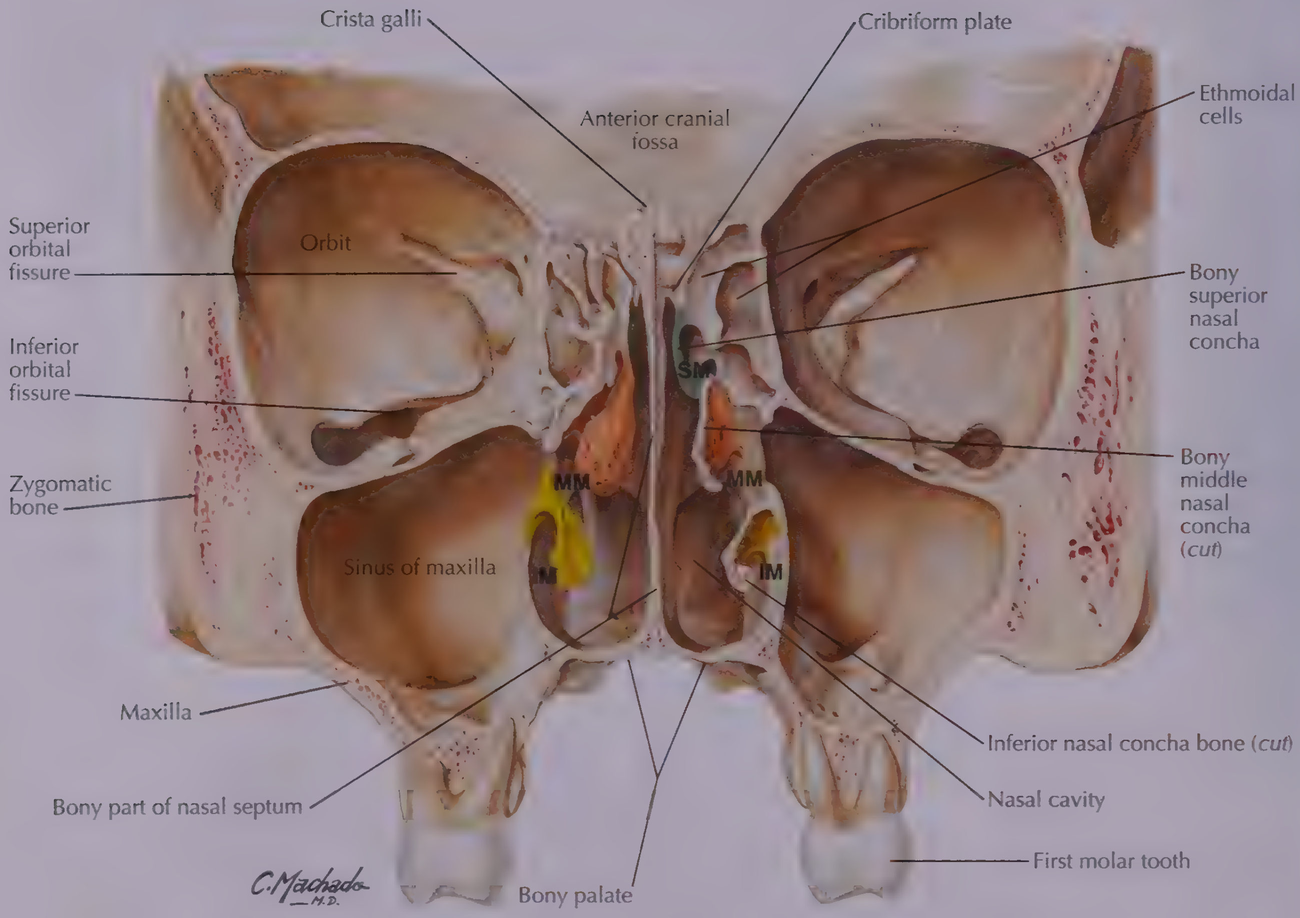

Superior view
Frontal suture (metopic suture)
Frontal bone
Anterior fontanelle
Coronal suture
Parietal bone
Sagittal suture
Posterior fontanelle
Occipital bone
Lambdoid suture

F. Netter M.D.

See also Plates 27, 43, BP 18, BP 35


Temporal bone
Sphenoid bone
Temporal fossa
Zygomatic arch
Condylar process of mandible
Mandibular notch
Coronoid process of mandible
Lateral pterygoid plate (*broken line*)
Pterygoid hamulus (*broken line*)
Pterygomandibular raphe (*broken line*)
Mandible
Ramus
Angle
Body
Stylohyoid ligament
Hyoid bone
Body
Lesser horn
Greater horn
Epiglottic cartilage
Thyroid cartilage
Cricoid cartilage
Tracheal cartilage
Mastoid process
Bony external acoustic meatus
Atlas (C1 vertebra)
Styloid process
Axis (C2 vertebra)
Stylomandibular ligament
C3 vertebra
C7 vertebra
T1 vertebra
1st rib


1
2
Plane of section
1 Ethmoid bone
2 Inferior nasal concha bone


Crista galli
Cribriform plate
Anterior cranial fossa
Ethmoidal cells
Superior orbital fissure
Orbit
Bony superior nasal concha
SM
Inferior orbital fissure
Bony middle nasal concha (*cut*)
MM
MM
Zygomatic bone
Sinus of maxilla
IM
IM
Maxilla
Inferior nasal concha bone (*cut*)
Nasal cavity
Bony part of nasal septum
First molar tooth
Bony palate

🟩 Bony superior nasal concha

🟧 Bony middle nasal concha

🟨 Inferior nasal concha bone

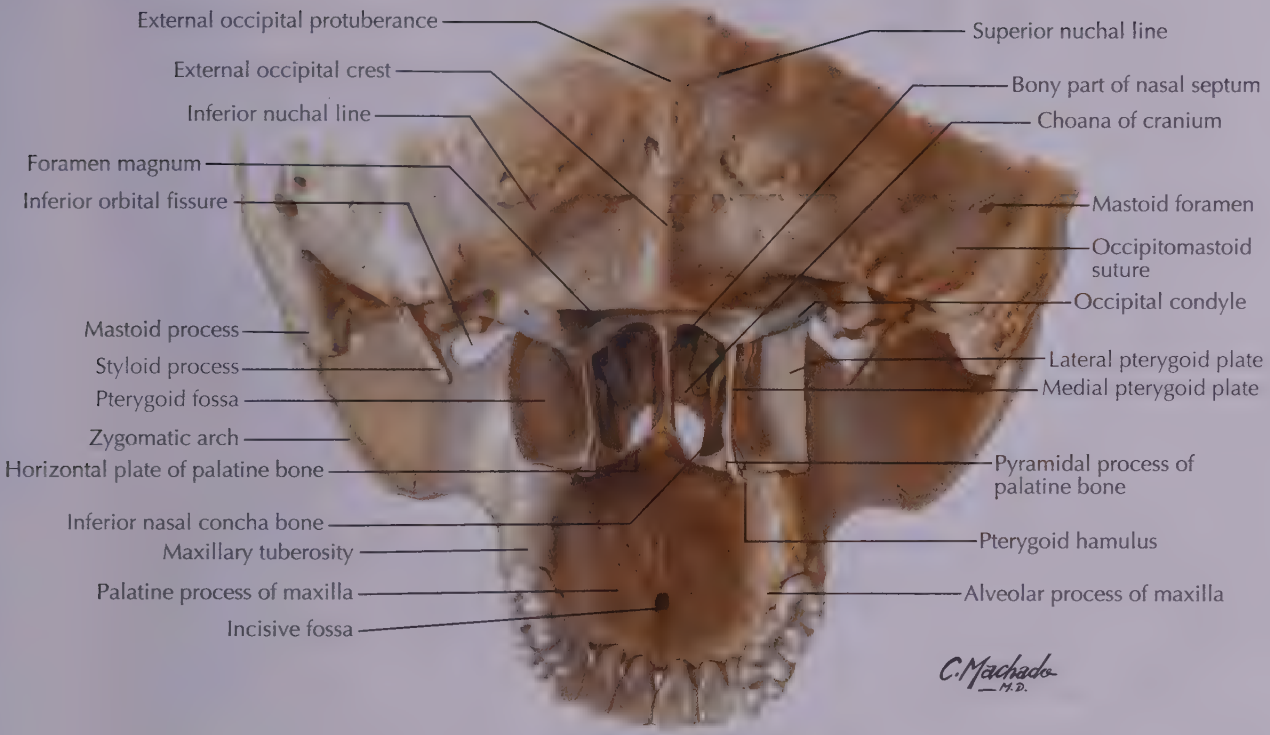
SM Superior nasal meatus

MM Middle nasal meatus

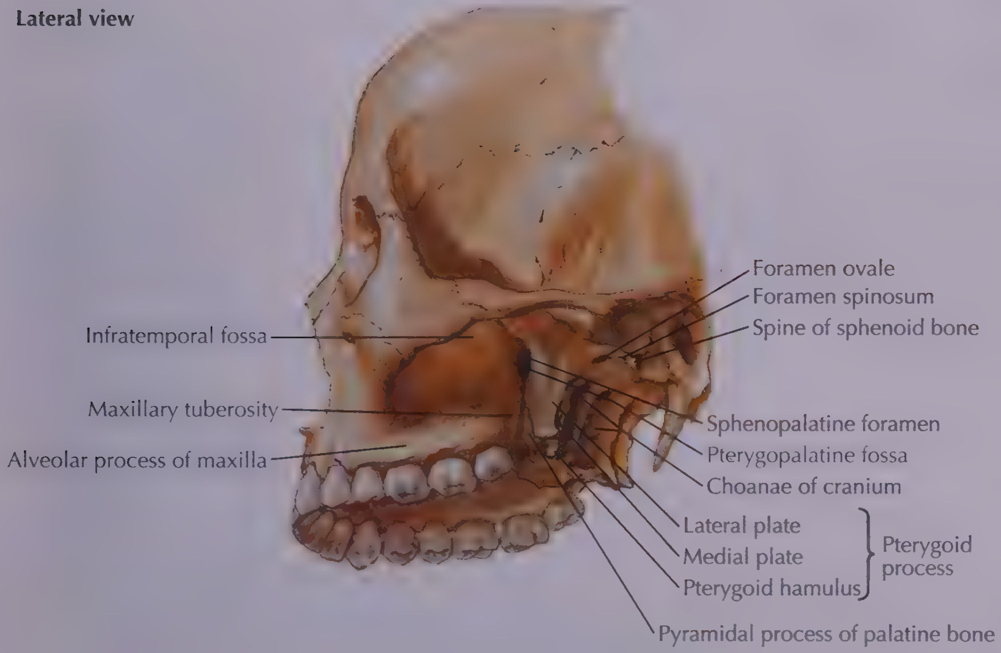
IM Inferior nasal meatus

See also Plates 64, 66, BP 21

Posterior view

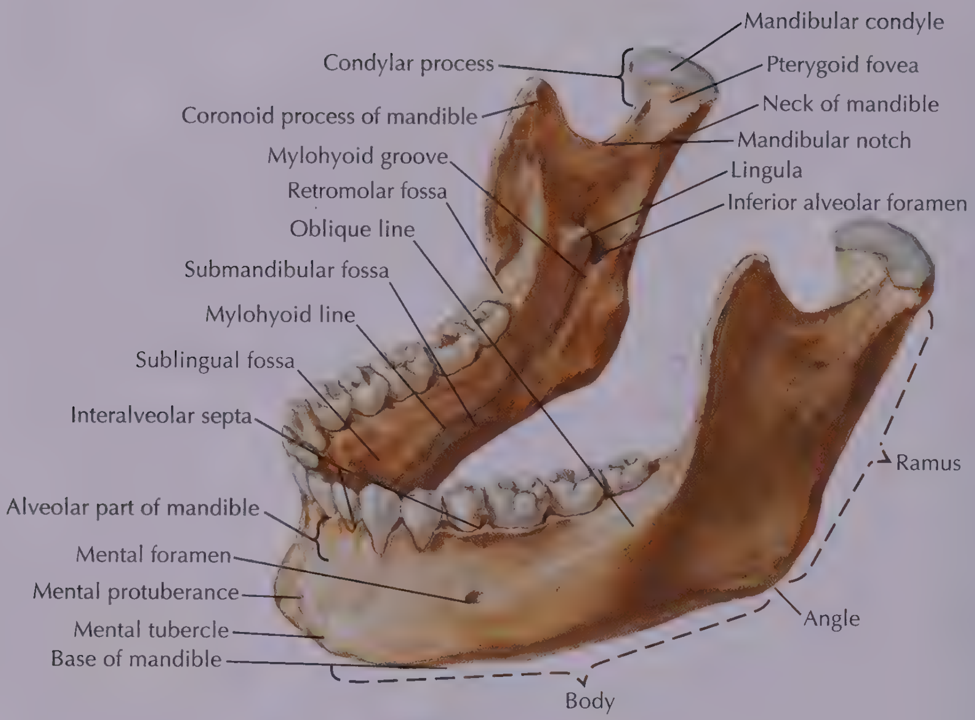

External occipital protuberance
External occipital crest
Inferior nuchal line
Foramen magnum
Inferior orbital fissure
Mastoid process
Styloid process
Pterygoid fossa
Zygomatic arch
Horizontal plate of palatine bone
Inferior nasal concha bone
Maxillary tuberosity
Palatine process of maxilla
Incisive fossa
Superior nuchal line
Bony part of nasal septum
Choana of cranium
Mastoid foramen
Occipitomastoid suture
Occipital condyle
Lateral pterygoid plate
Medial pterygoid plate
Pyramidal process of palatine bone
Pterygoid hamulus
Alveolar process of maxilla

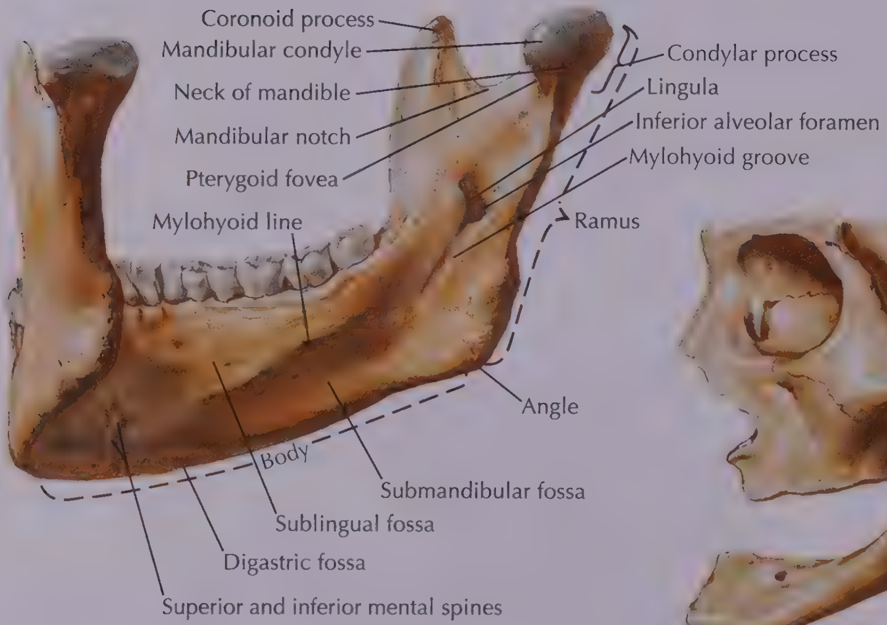
Lateral view

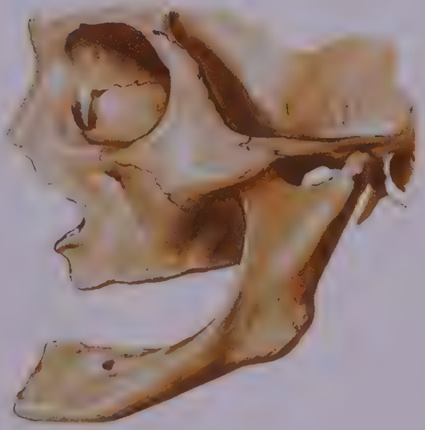

Infratemporal fossa
Maxillary tuberosity
Alveolar process of maxilla
Foramen ovale
Foramen spinosum
Spine of sphenoid bone
Sphenopalatine foramen
Pterygopalatine fossa
Choanae of cranium
Lateral plate
Medial plate
Pterygoid hamulus
Pterygoid process
Pyramidal process of palatine bone

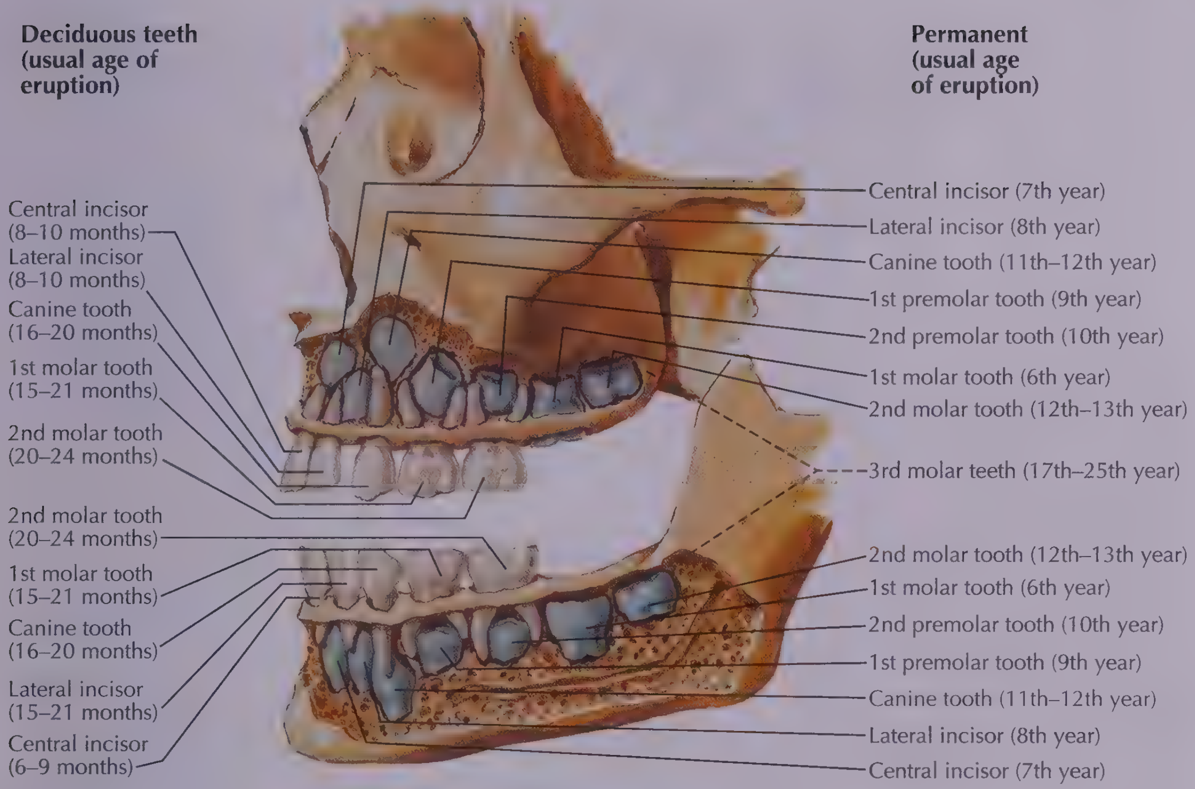
Mandible

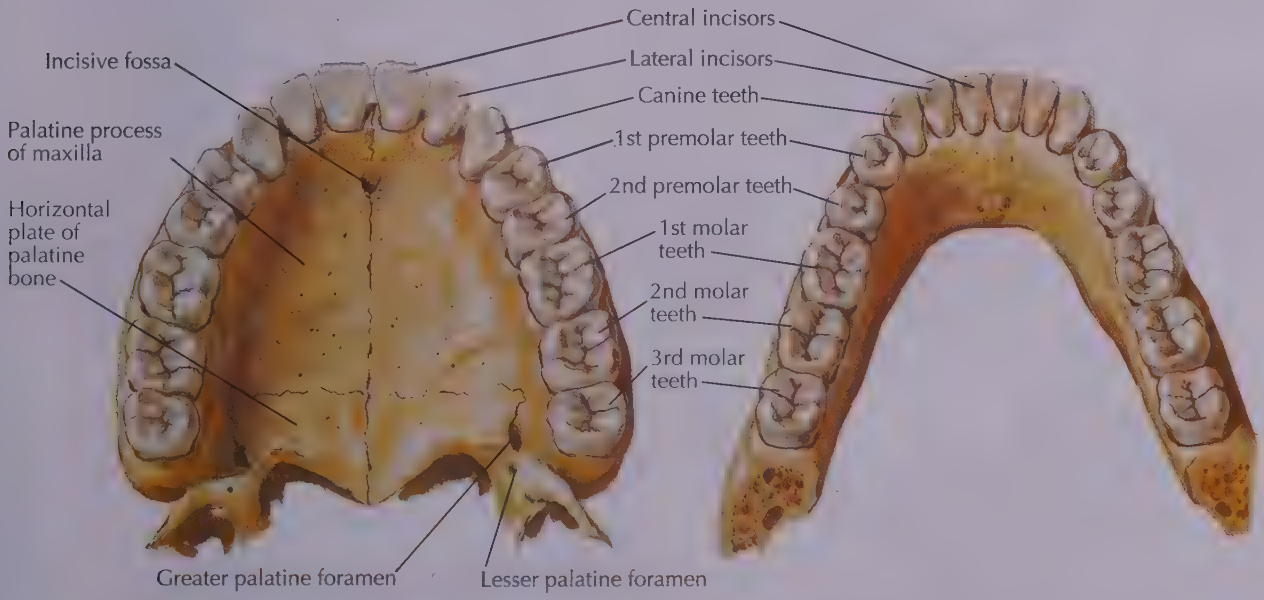
See also Plates 72, 73


Mandibular condyle
Condylar process
Pterygoid fovea
Coronoid process of mandible
Neck of mandible
Mandibular notch
Mylohyoid groove
Lingula
Retromolar fossa
Inferior alveolar foramen
Oblique line
Submandibular fossa
Mylohyoid line
Sublingual fossa
Interalveolar septa
Ramus
Alveolar part of mandible
Mental foramen
Mental protuberance
Angle
Mental tubercle
Base of mandible
Body


Coronoid process
Mandibular condyle
Condylar process
Lingula
Neck of mandible
Inferior alveolar foramen
Mandibular notch
Mylohyoid groove
Pterygoid fovea
Ramus
Mylohyoid line
Angle
Body
Submandibular fossa
Sublingual fossa
Digastric fossa
Superior and inferior mental spines


Mandible of aged, edentulous person


Deciduous teeth (usual age of eruption)
Permanent (usual age of eruption)
Central incisor (8–10 months)
Lateral incisor (8–10 months)
Canine tooth (16–20 months)
1st molar tooth (15–21 months)
2nd molar tooth (20–24 months)
2nd molar tooth (20–24 months)
1st molar tooth (15–21 months)
Canine tooth (16–20 months)
Lateral incisor (15–21 months)
Central incisor (6–9 months)
Central incisor (7th year)
Lateral incisor (8th year)
Canine tooth (11th–12th year)
1st premolar tooth (9th year)
2nd premolar tooth (10th year)
1st molar tooth (6th year)
2nd molar tooth (12th–13th year)
3rd molar teeth (17th–25th year)
2nd molar tooth (12th–13th year)
1st molar tooth (6th year)
2nd premolar tooth (10th year)
1st premolar tooth (9th year)
Canine tooth (11th–12th year)
Lateral incisor (8th year)
Central incisor (7th year)

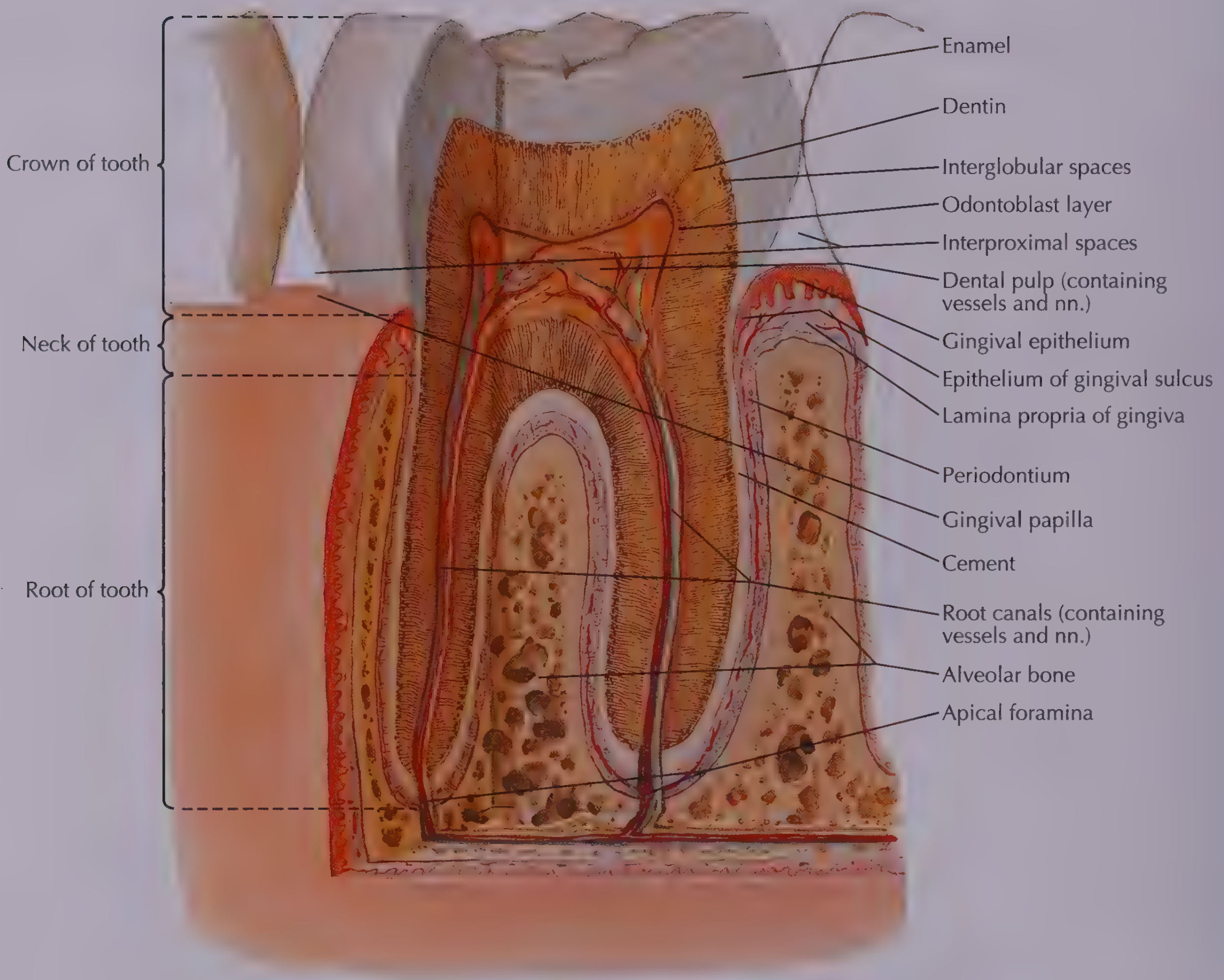

Incisive fossa
Palatine process of maxilla
Horizontal plate of palatine bone
Central incisors
Lateral incisors
Canine teeth
1st premolar teeth
2nd premolar teeth
1st molar teeth
2nd molar teeth
3rd molar teeth
Greater palatine foramen
Lesser palatine foramen

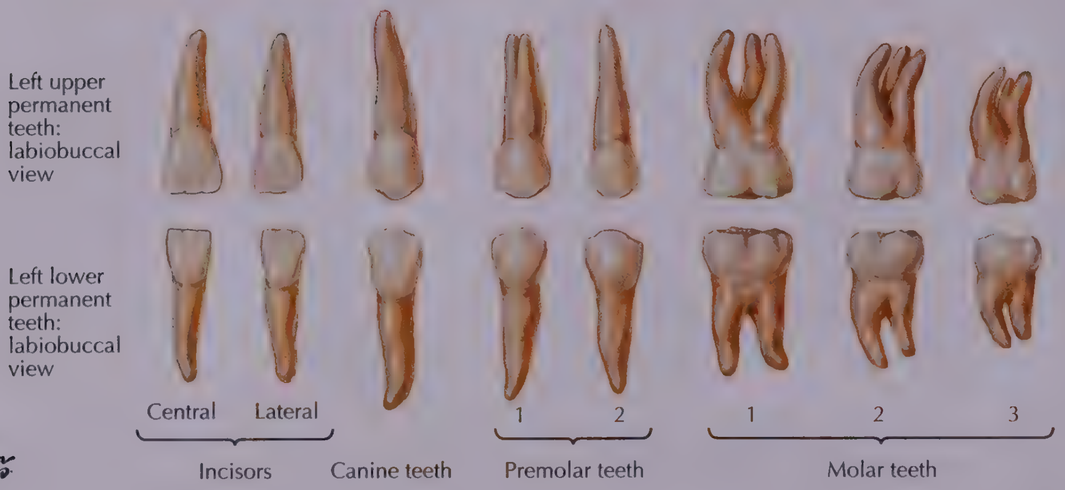
F. Netter M.D.

Upper permanent teeth

Lower permanent teeth

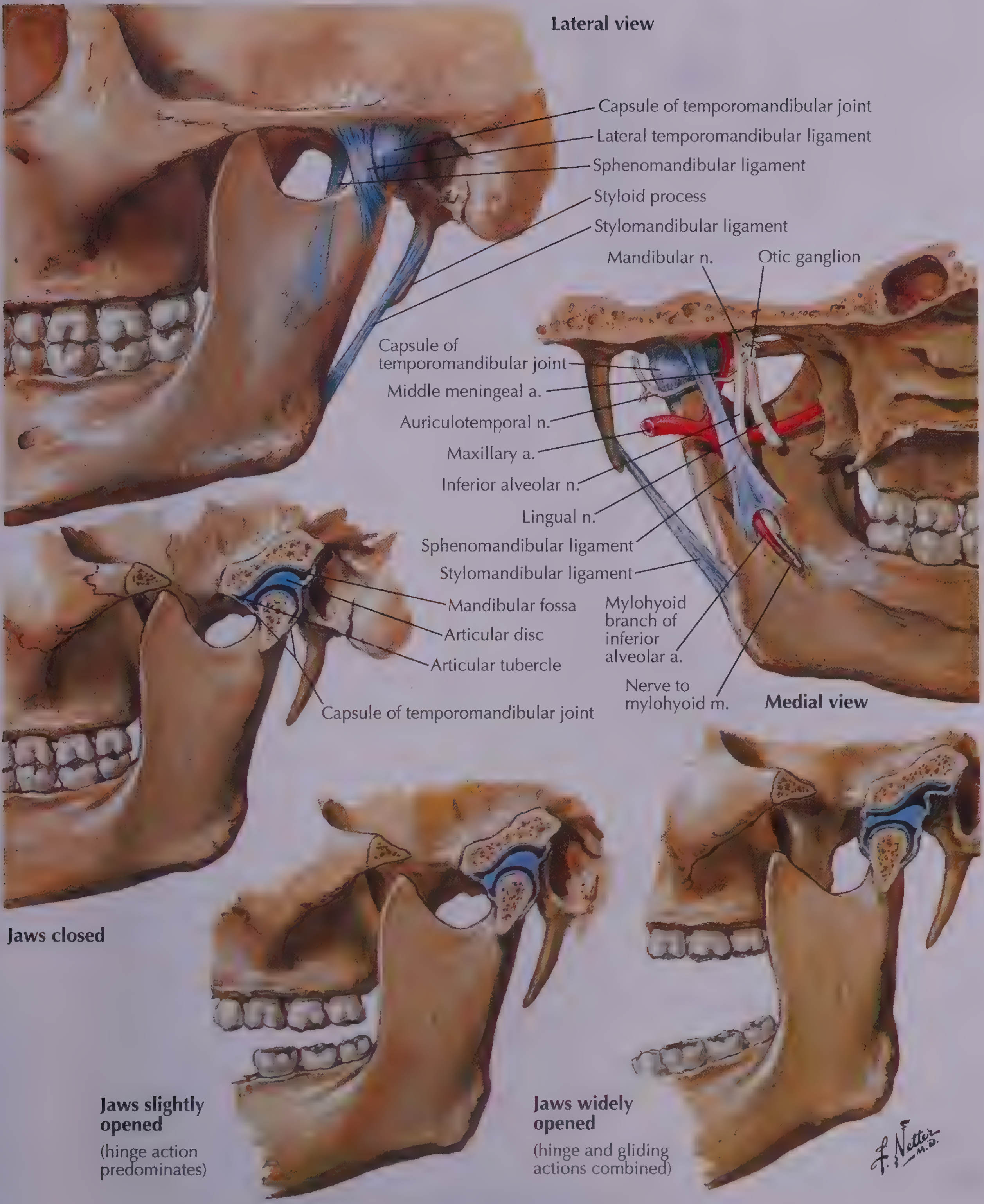
Tooth


Crown of tooth
Neck of tooth
Root of tooth
Enamel
Dentin
Interglobular spaces
Odontoblast layer
Interproximal spaces
Dental pulp (containing vessels and nn.)
Gingival epithelium
Epithelium of gingival sulcus
Lamina propria of gingiva
Periodontium
Gingival papilla
Cement
Root canals (containing vessels and nn.)
Alveolar bone
Apical foramina


Left upper permanent teeth: labiobuccal view
Left lower permanent teeth: labiobuccal view
Central
Lateral
Incisors
Canine teeth
1
2
Premolar teeth
1
2
3
Molar teeth

Temporomandibular Joint

See also Plates 73, 76



Lateral view

Capsule of temporomandibular joint
Lateral temporomandibular ligament
Sphenomandibular ligament
Styloid process
Stylomandibular ligament

Medial view

Mandibular n.
Otic ganglion
Capsule of temporomandibular joint
Middle meningeal a.
Auriculotemporal n.
Maxillary a.
Inferior alveolar n.
Lingual n.
Sphenomandibular ligament
Stylomandibular ligament
Mylohyoid branch of inferior alveolar a.
Nerve to mylohyoid m.

Jaws closed

Mandibular fossa
Articular disc
Articular tubercle
Capsule of temporomandibular joint

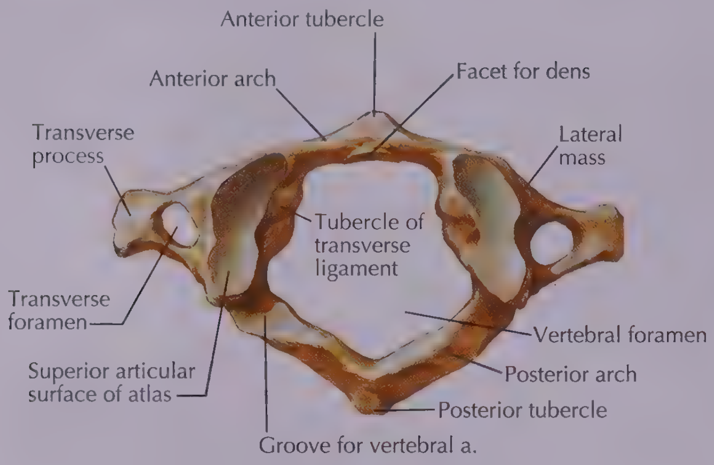
Jaws slightly opened
(hinge action predominates)

Jaws widely opened
(hinge and gliding actions combined)

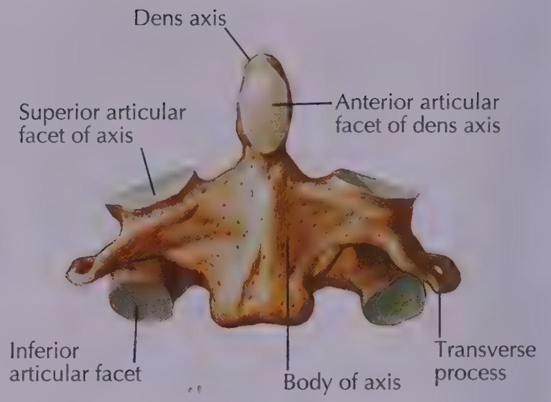
F. Netter M.D.

Cervical Vertebrae: Atlas and Axis

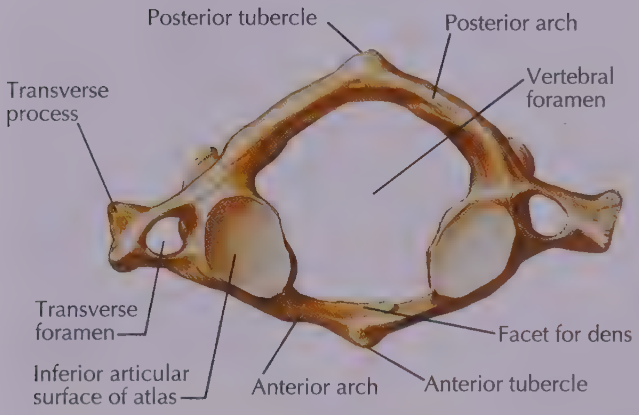
See also Plates 45, 47, BP 18


Anterior tubercle
Anterior arch
Facet for dens
Transverse process
Lateral mass
Tubercle of transverse ligament
Transverse foramen
Vertebral foramen
Superior articular surface of atlas
Posterior arch
Posterior tubercle
Groove for vertebral a.

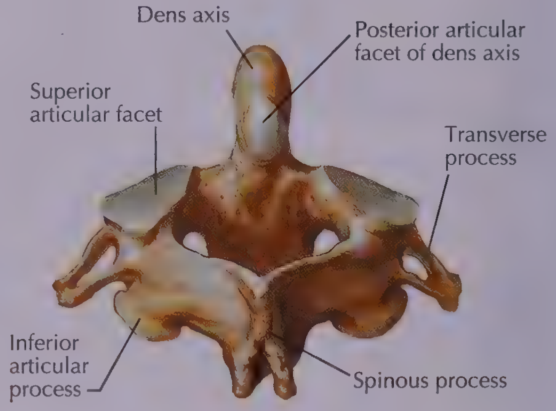
Atlas: superior view


Dens axis
Superior articular facet of axis
Anterior articular facet of dens axis
Inferior articular facet
Body of axis
Transverse process

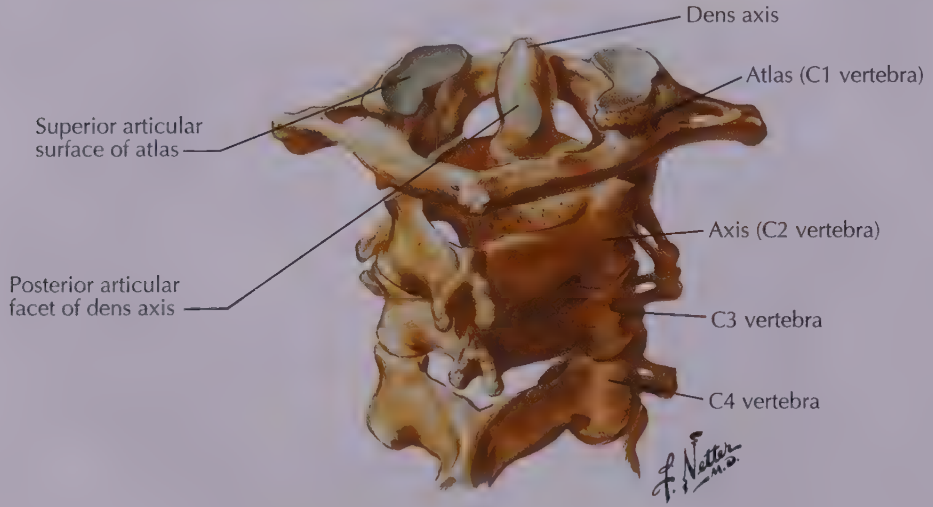
Axis: anterior view


Posterior tubercle
Posterior arch
Transverse process
Vertebral foramen
Transverse foramen
Facet for dens
Inferior articular surface of atlas
Anterior arch
Anterior tubercle

Atlas: inferior view


Dens axis
Posterior articular facet of dens axis
Superior articular facet
Transverse process
Inferior articular process
Spinous process

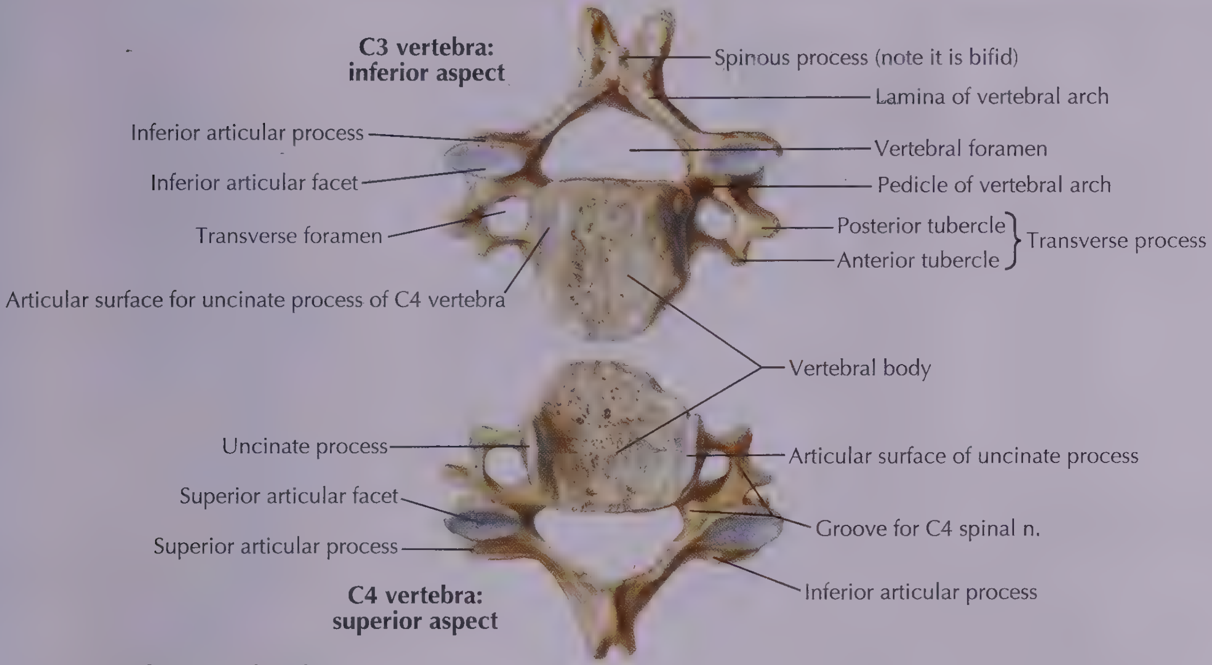
Axis: posterosuperior view


Dens axis
Atlas (C1 vertebra)
Superior articular surface of atlas
Axis (C2 vertebra)
Posterior articular facet of dens axis
C3 vertebra
C4 vertebra

Upper cervical vertebrae: posterosuperior view

See also Plates 37, 45, 46

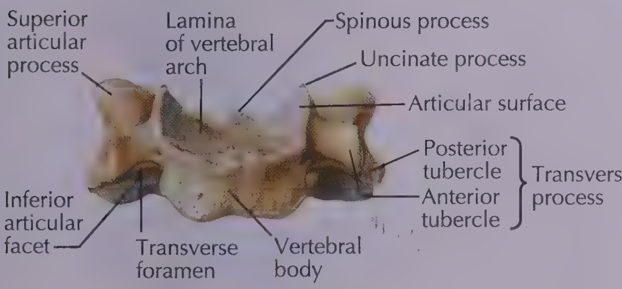
Inferior aspect of C3 vertebra and superior aspect of C4 vertebra showing the sites of the articular surfaces of the uncovertebral joints


C3 vertebra: inferior aspect

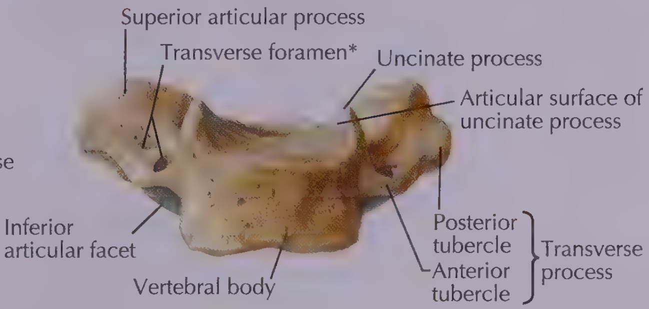
C4 vertebra: superior aspect

Spinous process (note it is bifid)
Lamina of vertebral arch
Inferior articular process
Vertebral foramen
Inferior articular facet
Pedicle of vertebral arch
Transverse foramen
Posterior tubercle
Anterior tubercle
Transverse process
Articular surface for uncinate process of C4 vertebra
Vertebral body
Uncinate process
Articular surface of uncinate process
Superior articular facet
Groove for C4 spinal n.
Superior articular process
Inferior articular process

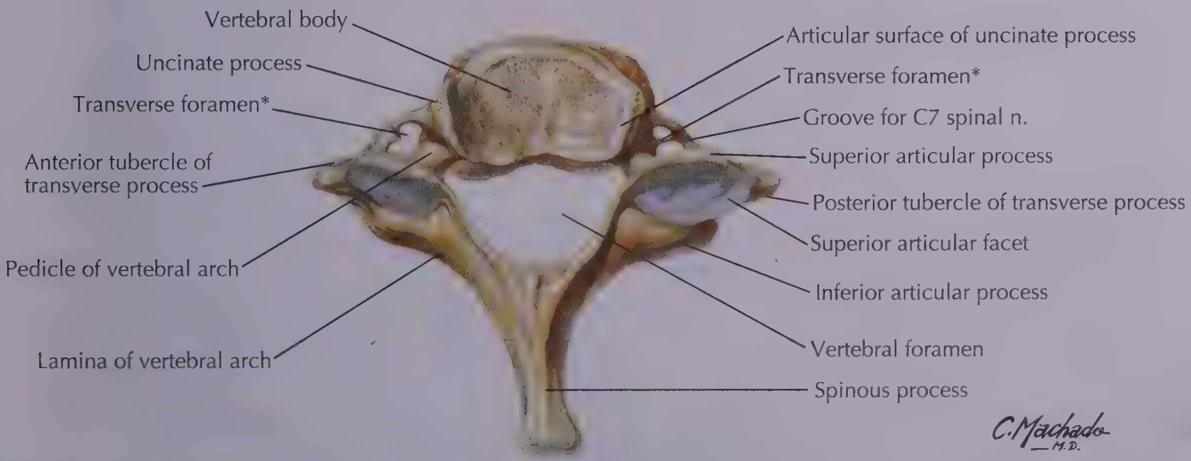
C4 vertebra: anterior view


Superior articular process
Lamina of vertebral arch
Spinous process
Uncinate process
Articular surface
Posterior tubercle
Anterior tubercle
Transverse process
Inferior articular facet
Transverse foramen
Vertebral body

C7 vertebra: anterior view


Superior articular process
Transverse foramen*
Uncinate process
Articular surface of uncinate process
Inferior articular facet
Posterior tubercle
Anterior tubercle
Transverse process
Vertebral body

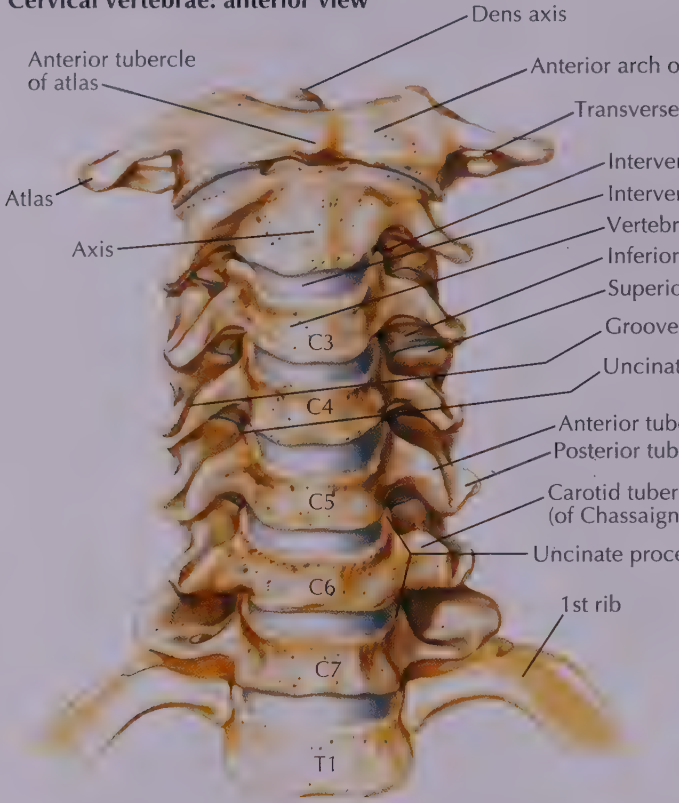
C7 vertebra (vertebra prominens): superior view

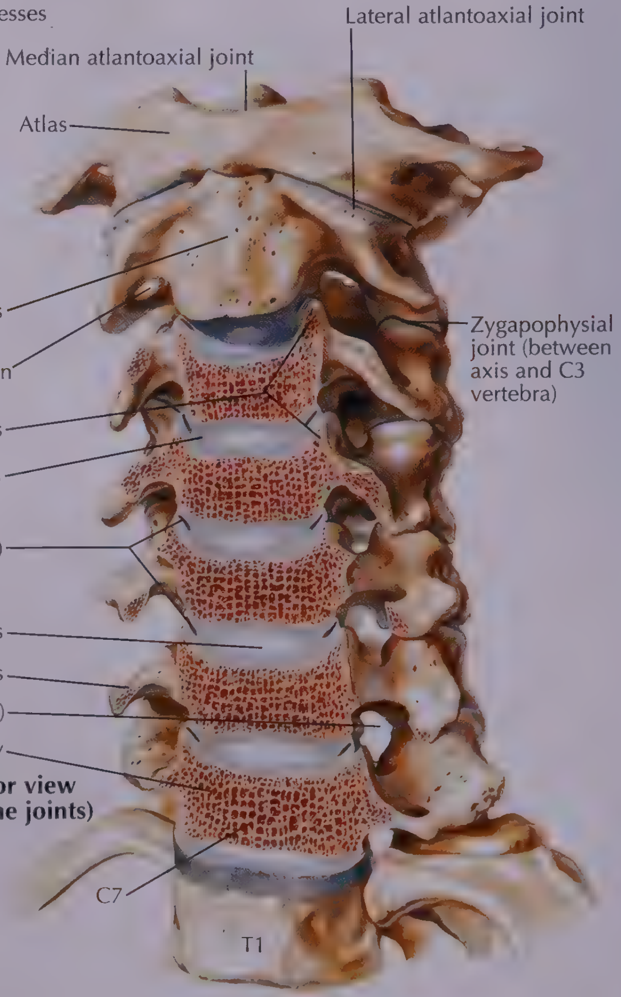

Vertebral body
Uncinate process
Transverse foramen*
Anterior tubercle of transverse process
Pedicle of vertebral arch
Lamina of vertebral arch
Articular surface of uncinate process
Transverse foramen*
Groove for C7 spinal n.
Superior articular process
Posterior tubercle of transverse process
Superior articular facet
Inferior articular process
Vertebral foramen
Spinous process
C.Machado M.D.

**The transverse foramina of C7 transmit vertebral veins, but usually not the vertebral artery, and are asymmetrical in these drawings. Note the right transverse foramen is septated.*

See also Plates 46, BP 17, BP 18

Cervical vertebrae: anterior view

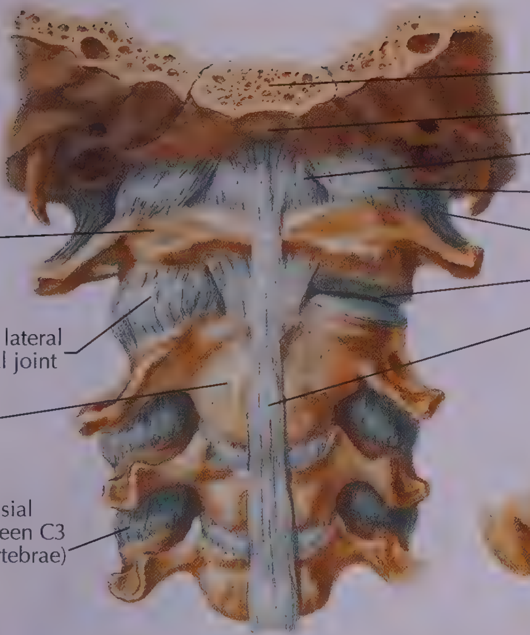

Dens axis
Anterior tubercle of atlas
Anterior arch of atlas
Transverse foramen
Atlas
Intervertebral foramen (for C3 spinal n.)
Intervertebral disc
Axis
Vertebral body
Inferior articular process (of C3 vertebra)
Superior articular process (of C4 vertebra)
Groove for spinal n.
C3
Uncinate process
C4
Anterior tubercle
Posterior tubercle
Transverse process
C5
Carotid tubercle (of Chassaignac)
Uncinate processes
C6
1st rib
C7
T1


Lateral atlantoaxial joint
Median atlantoaxial joint
Atlas
Axis
Zygapophysial joint (between axis and C3 vertebra)
Transverse foramen
Uncinate processes
Anulus fibrosus
Uncovertebral joints (clefts of Luschka)
Nucleus pulposus
Transverse process
Intervertebral foramen (for C7 spinal n.)
Vertebral body
C7
T1

The uncovertebral joints of the cervical spine: anterior view (C3 to C7 have been sectioned coronally to expose the joints)

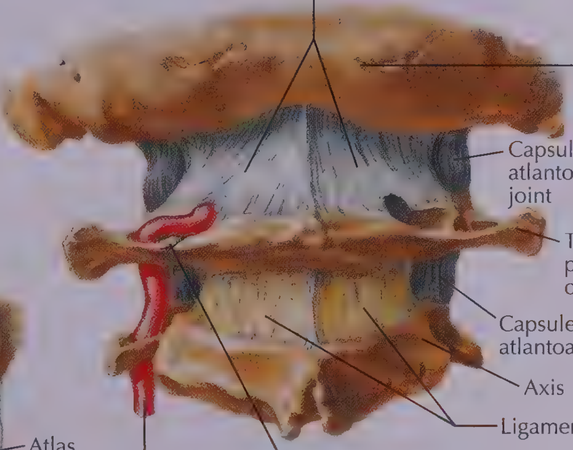
C. Machado M.D.

External Craniocervical Ligaments



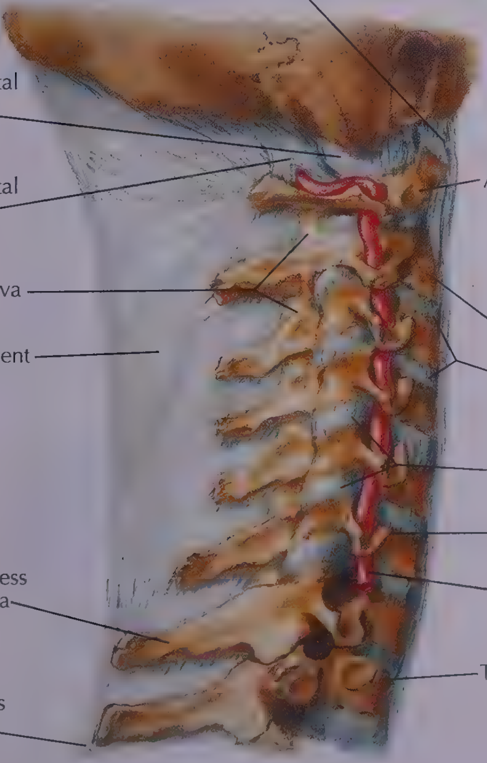
Anterior view

Basilar part of occipital bone
Pharyngeal tubercle
Anterior atlantooccipital membrane
Capsule of atlantooccipital joint
Posterior atlantooccipital membrane
Lateral atlantoaxial joint (*exposed*)
Anterior longitudinal ligament
Atlas
Capsule of lateral atlantoaxial joint
Axis
Capsule of zygapophysial joint (between C3 and C4 vertebrae)



Posterior view

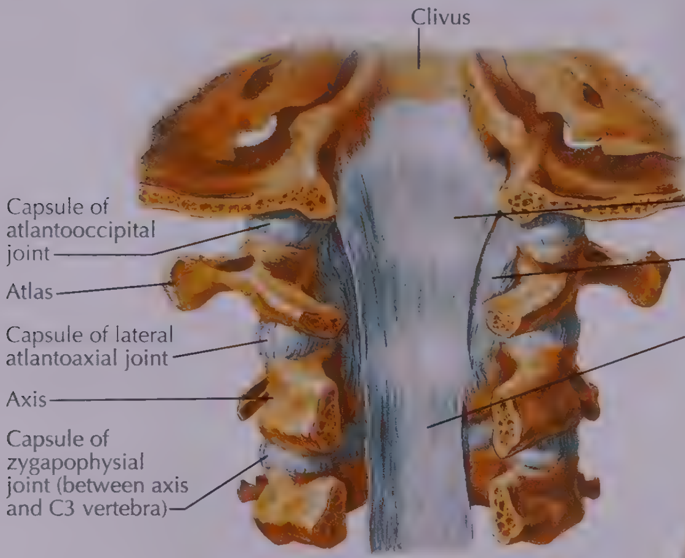
Posterior atlantooccipital membrane
Occipital bone
Capsule of atlantooccipital joint
Transverse process of atlas
Capsule of lateral atlantoaxial joint
Axis
Ligamenta flava
Vertebral a.
Suboccipital n.



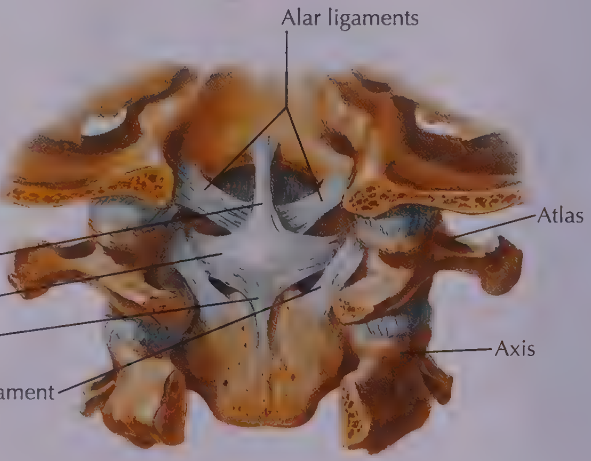
Right lateral view

Anterior atlantooccipital membrane
Capsule of atlantooccipital joint
Posterior atlantooccipital membrane
Atlas
Ligamenta flava
Nuchal ligament
Body of axis
Intervertebral discs
Zygapophysial joints
Anterior tubercle of C6 vertebra (carotid tubercle of Chassaignac)
Vertebral a.
Spinous process of C7 vertebra
T1 vertebra
Supraspinous ligament

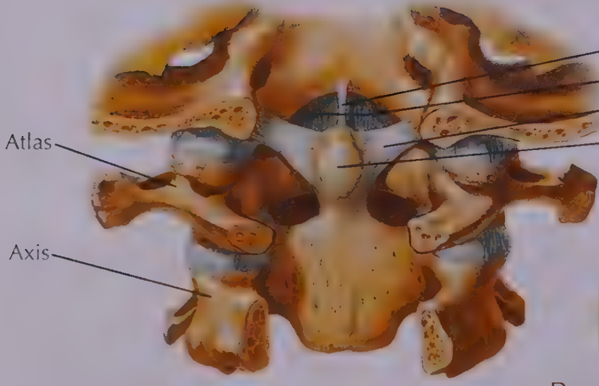
See also Plates 43, BP 18, BP 35


Clivus
Capsule of atlantooccipital joint
Atlas
Capsule of lateral atlantoaxial joint
Axis
Capsule of zygapophysial joint (between axis and C3 vertebra)
Tectorial membrane of cervical vertebral column
Accessory atlantoaxial ligament
Posterior longitudinal ligament

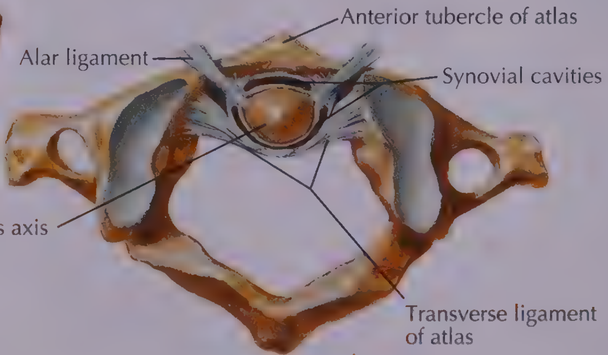
Upper part of vertebral canal: posterior view (spinous processes and parts of vertebral arches removed to expose ligaments posterior to the vertebral bodies)


Alar ligaments
Atlas
Cruciform ligament
Superior longitudinal band
Transverse ligament of atlas
Inferior longitudinal band
Axis
Accessory atlantoaxial ligament

Tectorial membrane removed to expose deeper ligaments: posterior view


Atlas
Axis
Apical ligament of dens
Anterior atlantooccipital ligament
Alar ligament
Posterior articular facet of dens axis

Cruciform ligament removed to show deeper ligaments: posterior view

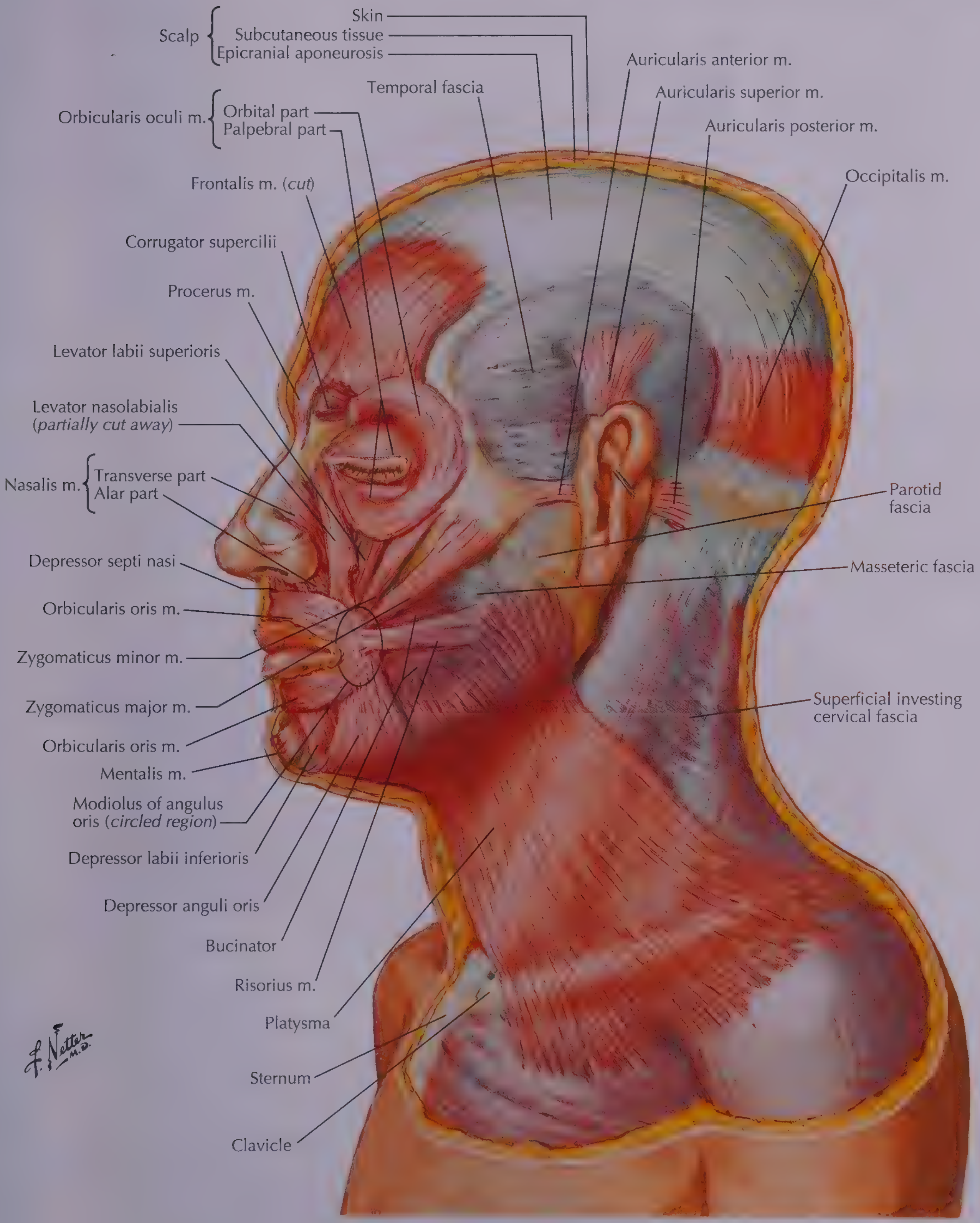

Anterior tubercle of atlas
Alar ligament
Synovial cavities
Dens axis
Transverse ligament of atlas

Median atlantoaxial joint: superior view

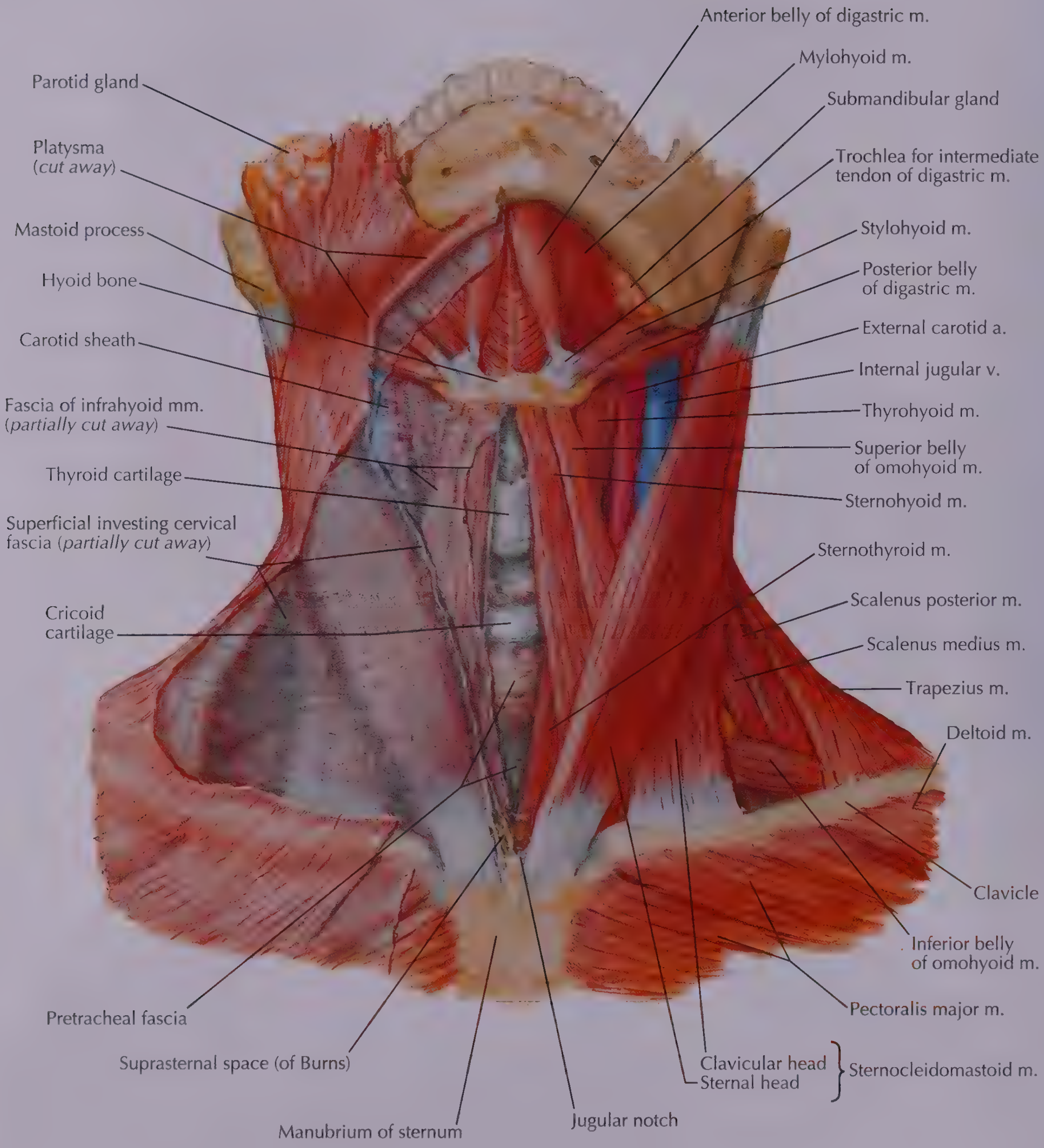
F. Netter M.D.

Muscles of Facial Expression: Lateral View

See also Plates 52, 72, 73, BP 19, BP 20


Scalp
Skin
Subcutaneous tissue
Epicranial aponeurosis
Temporal fascia
Orbicularis oculi m.
Orbital part
Palpebral part
Frontalis m. (*cut*)
Corrugator supercilii
Procerus m.
Levator labii superioris
Levator nasolabialis (*partially cut away*)
Nasalis m.
Transverse part
Alar part
Depressor septi nasi
Orbicularis oris m.
Zygomaticus minor m.
Zygomaticus major m.
Orbicularis oris m.
Mentalis m.
Modiolus of angulus oris (*circled region*)
Depressor labii inferioris
Depressor anguli oris
Bucinator
Risorius m.
Platysma
Sternum
Clavicle
Auricularis anterior m.
Auricularis superior m.
Auricularis posterior m.
Occipitalis m.
Parotid fascia
Masseteric fascia
Superficial investing cervical fascia
F. Netter M.D.

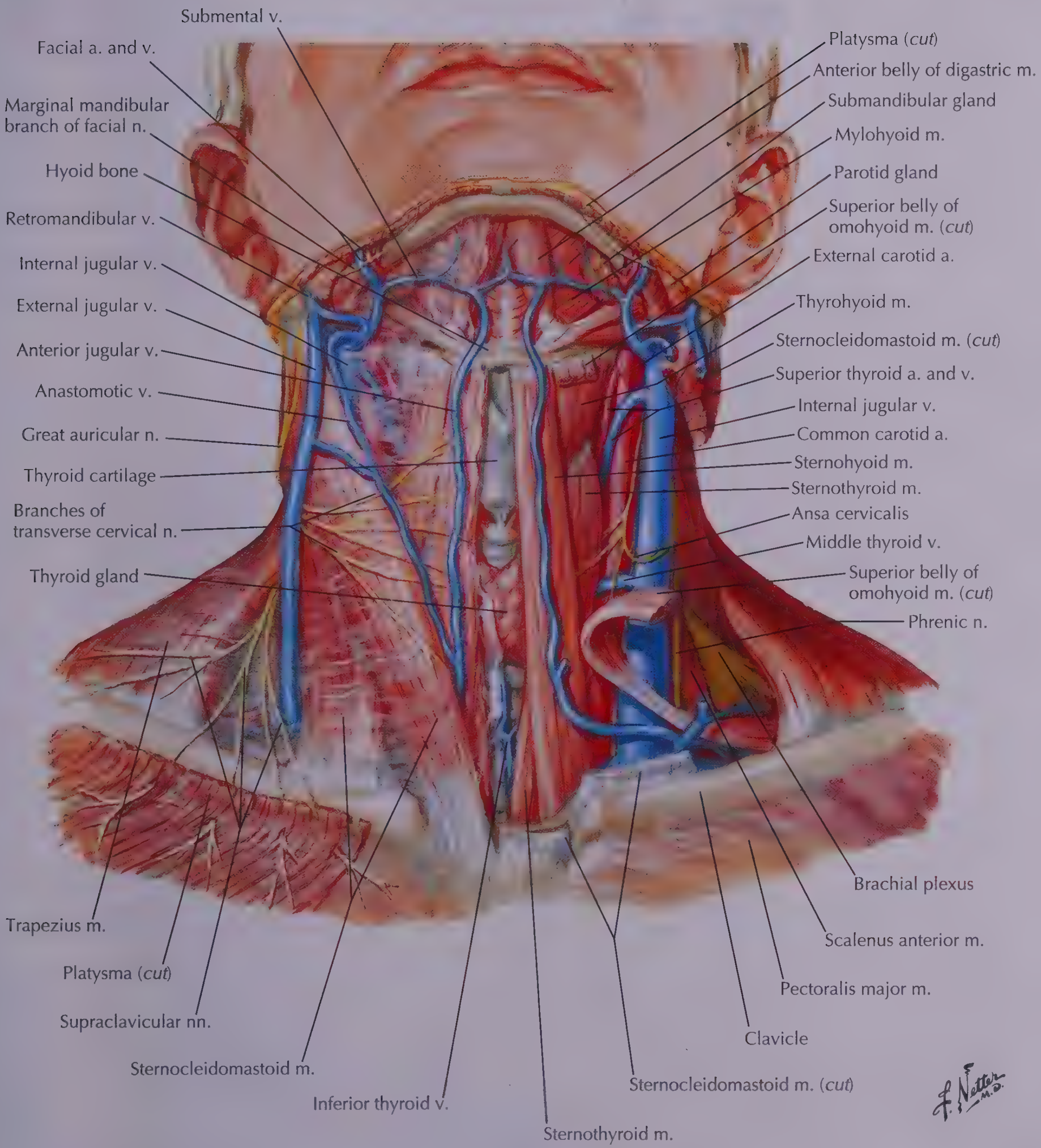
See also Plates 37, 50, 51, 53


Anterior belly of digastric m.
Mylohyoid m.
Submandibular gland
Trochlea for intermediate tendon of digastric m.
Stylohyoid m.
Posterior belly of digastric m.
External carotid a.
Internal jugular v.
Thyrohyoid m.
Superior belly of omohyoid m.
Sternohyoid m.
Sternothyroid m.
Scalenus posterior m.
Scalenus medius m.
Trapezius m.
Deltoid m.
Clavicle
Inferior belly of omohyoid m.
Pectoralis major m.
Clavicular head
Sternal head
Sternocleidomastoid m.
Jugular notch
Manubrium of sternum
Suprasternal space (of Burns)
Pretracheal fascia
Cricoid cartilage
Superficial investing cervical fascia (partially cut away)
Thyroid cartilage
Fascia of infrahyoid mm. (partially cut away)
Carotid sheath
Hyoid bone
Mastoid process
Platysma (cut away)
Parotid gland

F. Netter M.D.

Superficial Veins of Neck

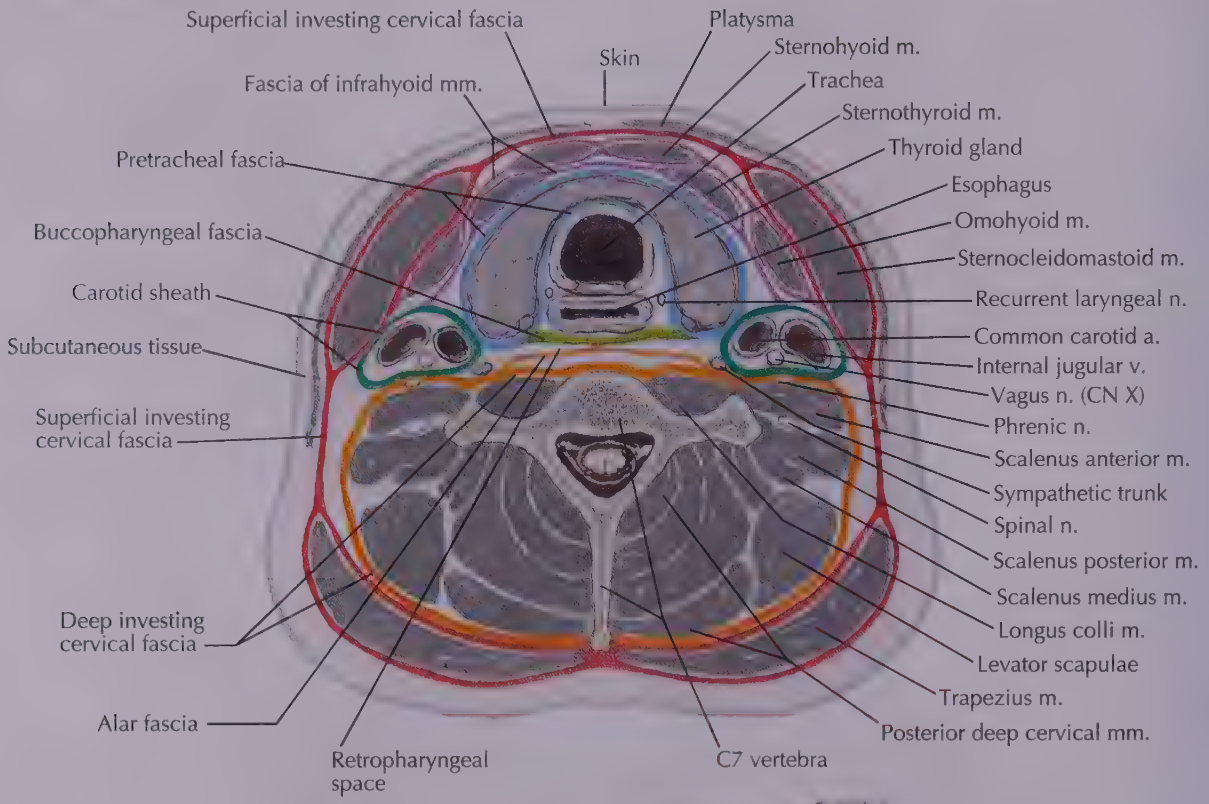
See also Plates 37, 100


Submental v.
Facial a. and v.
Marginal mandibular branch of facial n.
Hyoid bone
Retromandibular v.
Internal jugular v.
External jugular v.
Anterior jugular v.
Anastomotic v.
Great auricular n.
Thyroid cartilage
Branches of transverse cervical n.
Thyroid gland
Platysma (*cut*)
Anterior belly of digastric m.
Submandibular gland
Mylohyoid m.
Parotid gland
Superior belly of omohyoid m. (*cut*)
External carotid a.
Thyrohyoid m.
Sternocleidomastoid m. (*cut*)
Superior thyroid a. and v.
Internal jugular v.
Common carotid a.
Sternohyoid m.
Sternothyroid m.
Ansa cervicalis
Middle thyroid v.
Superior belly of omohyoid m. (*cut*)
Phrenic n.
Brachial plexus
Scalenus anterior m.
Pectoralis major m.
Clavicle
Sternocleidomastoid m. (*cut*)
Sternothyroid m.
Inferior thyroid v.
Sternocleidomastoid m.
Supraclavicular nn.
Platysma (*cut*)
Trapezius m.
F. Netter M.D.

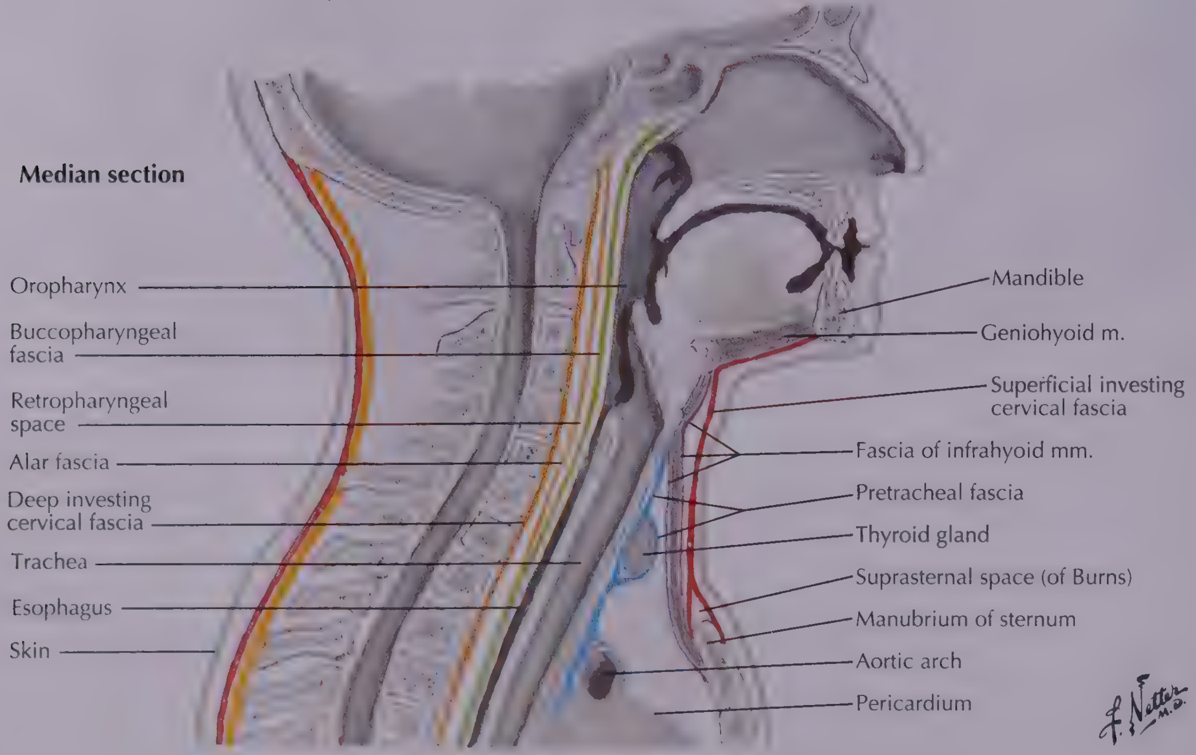
Fascial Layers of Neck

See also Plate 49

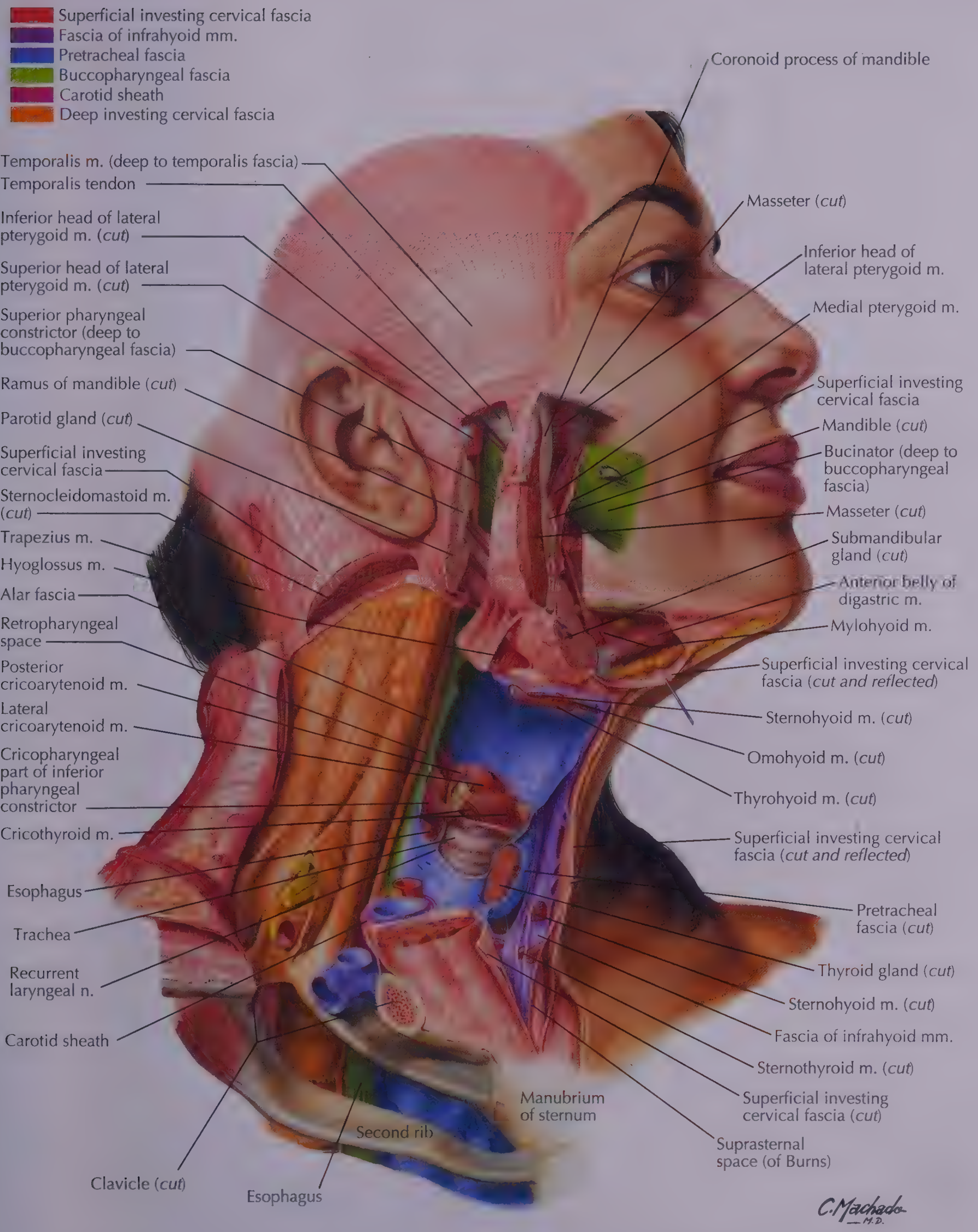
Cross section


Superficial investing cervical fascia
Fascia of infrahyoid mm.
Pretracheal fascia
Buccopharyngeal fascia
Carotid sheath
Subcutaneous tissue
Superficial investing cervical fascia
Deep investing cervical fascia
Alar fascia
Retropharyngeal space
Skin
Platysma
Sternohyoid m.
Trachea
Sternothyroid m.
Thyroid gland
Esophagus
Omohyoid m.
Sternocleidomastoid m.
Recurrent laryngeal n.
Common carotid a.
Internal jugular v.
Vagus n. (CN X)
Phrenic n.
Scalenus anterior m.
Sympathetic trunk
Spinal n.
Scalenus posterior m.
Scalenus medius m.
Longus colli m.
Levator scapulae
Trapezius m.
Posterior deep cervical mm.
C7 vertebra

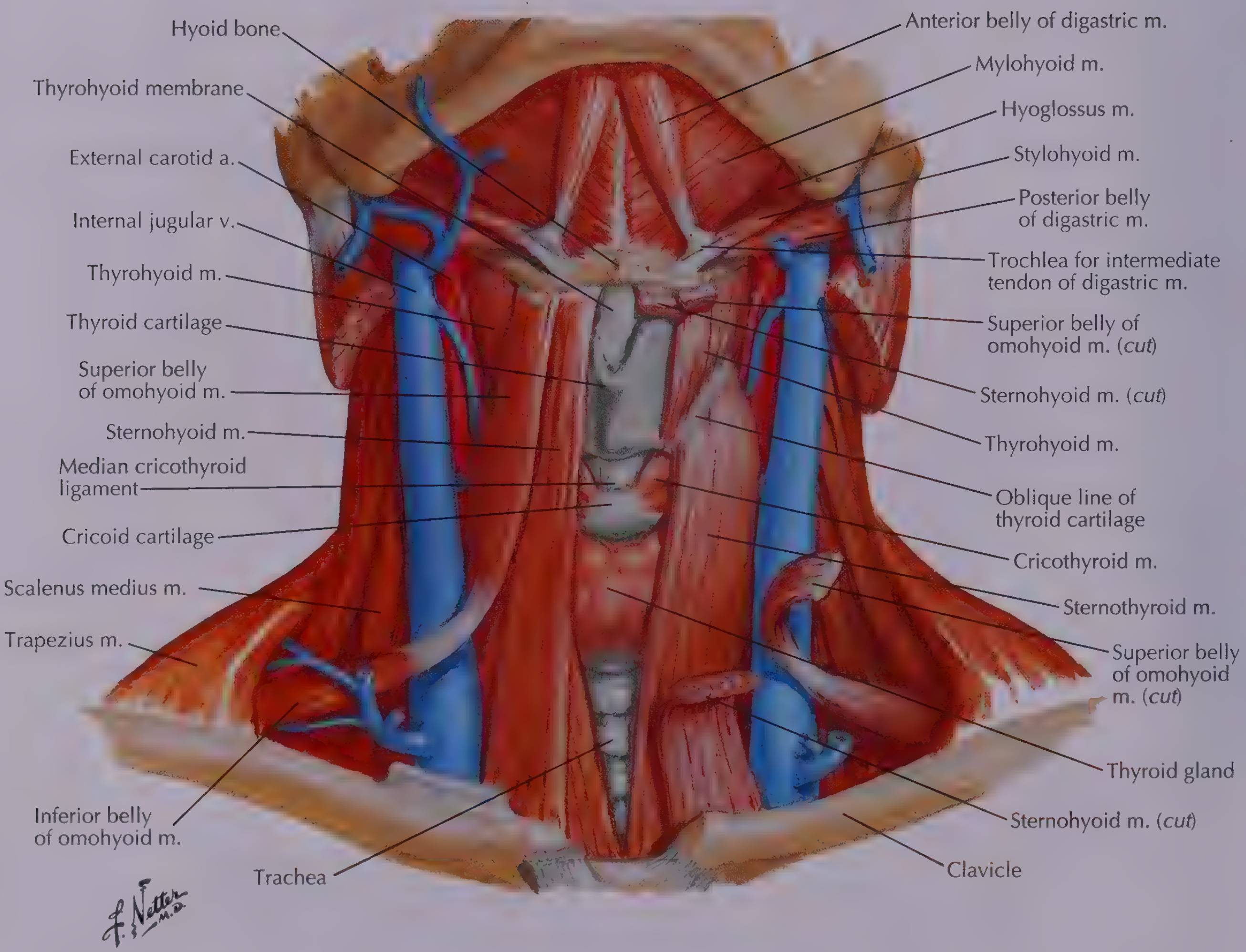
Median section


Oropharynx
Buccopharyngeal fascia
Retropharyngeal space
Alar fascia
Deep investing cervical fascia
Trachea
Esophagus
Skin
Mandible
Geniohyoid m.
Superficial investing cervical fascia
Fascia of infrahyoid mm.
Pretracheal fascia
Thyroid gland
Suprasternal space (of Burns)
Manubrium of sternum
Aortic arch
Pericardium

See also Plates 49, 50, 51

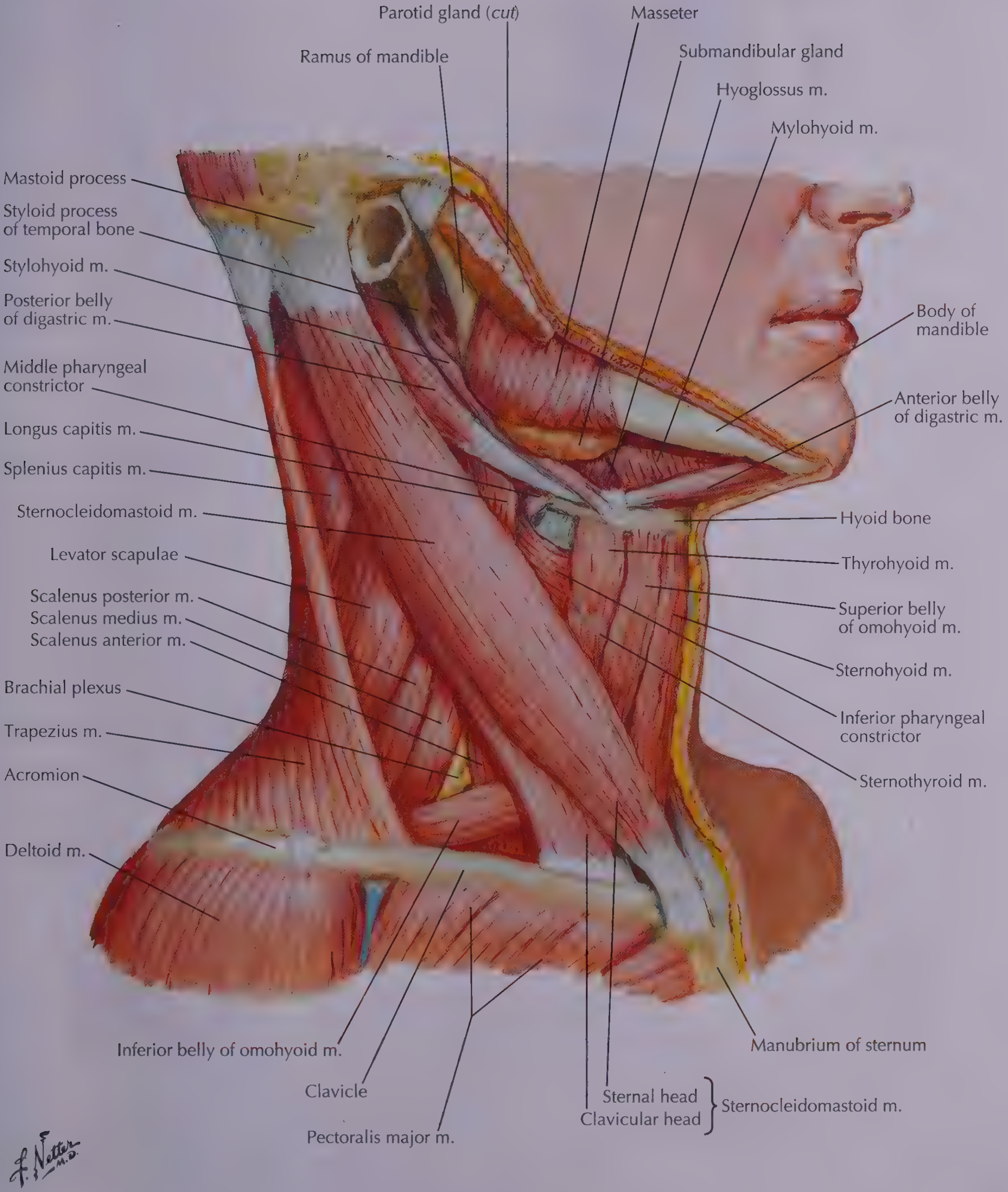

🟥 Superficial investing cervical fascia
🟪 Fascia of infrahyoid mm.
🟦 Pretracheal fascia
🟩 Buccopharyngeal fascia
🟪 Carotid sheath
🟧 Deep investing cervical fascia
Temporalis m. (deep to temporalis fascia)
Temporalis tendon
Inferior head of lateral pterygoid m. (*cut*)
Superior head of lateral pterygoid m. (*cut*)
Superior pharyngeal constrictor (deep to buccopharyngeal fascia)
Ramus of mandible (*cut*)
Parotid gland (*cut*)
Superficial investing cervical fascia
Sternocleidomastoid m. (*cut*)
Trapezius m.
Hyoglossus m.
Alar fascia
Retropharyngeal space
Posterior cricoarytenoid m.
Lateral cricoarytenoid m.
Cricopharyngeal part of inferior pharyngeal constrictor
Cricothyroid m.
Esophagus
Trachea
Recurrent laryngeal n.
Carotid sheath
Clavicle (*cut*)
Esophagus
Second rib
Manubrium of sternum
Coronoid process of mandible
Masseter (*cut*)
Inferior head of lateral pterygoid m.
Medial pterygoid m.
Superficial investing cervical fascia
Mandible (*cut*)
Bucinator (deep to buccopharyngeal fascia)
Masseter (*cut*)
Submandibular gland (*cut*)
Anterior belly of digastric m.
Mylohyoid m.
Superficial investing cervical fascia (*cut and reflected*)
Sternohyoid m. (*cut*)
Omohyoid m. (*cut*)
Thyrohyoid m. (*cut*)
Superficial investing cervical fascia (*cut and reflected*)
Pretracheal fascia (*cut*)
Thyroid gland (*cut*)
Sternohyoid m. (*cut*)
Fascia of infrahyoid mm.
Sternothyroid m. (*cut*)
Superficial investing cervical fascia (*cut*)
Suprasternal space (of Burns)
C.Machado M.D.

See also Plates 49, 54, 87

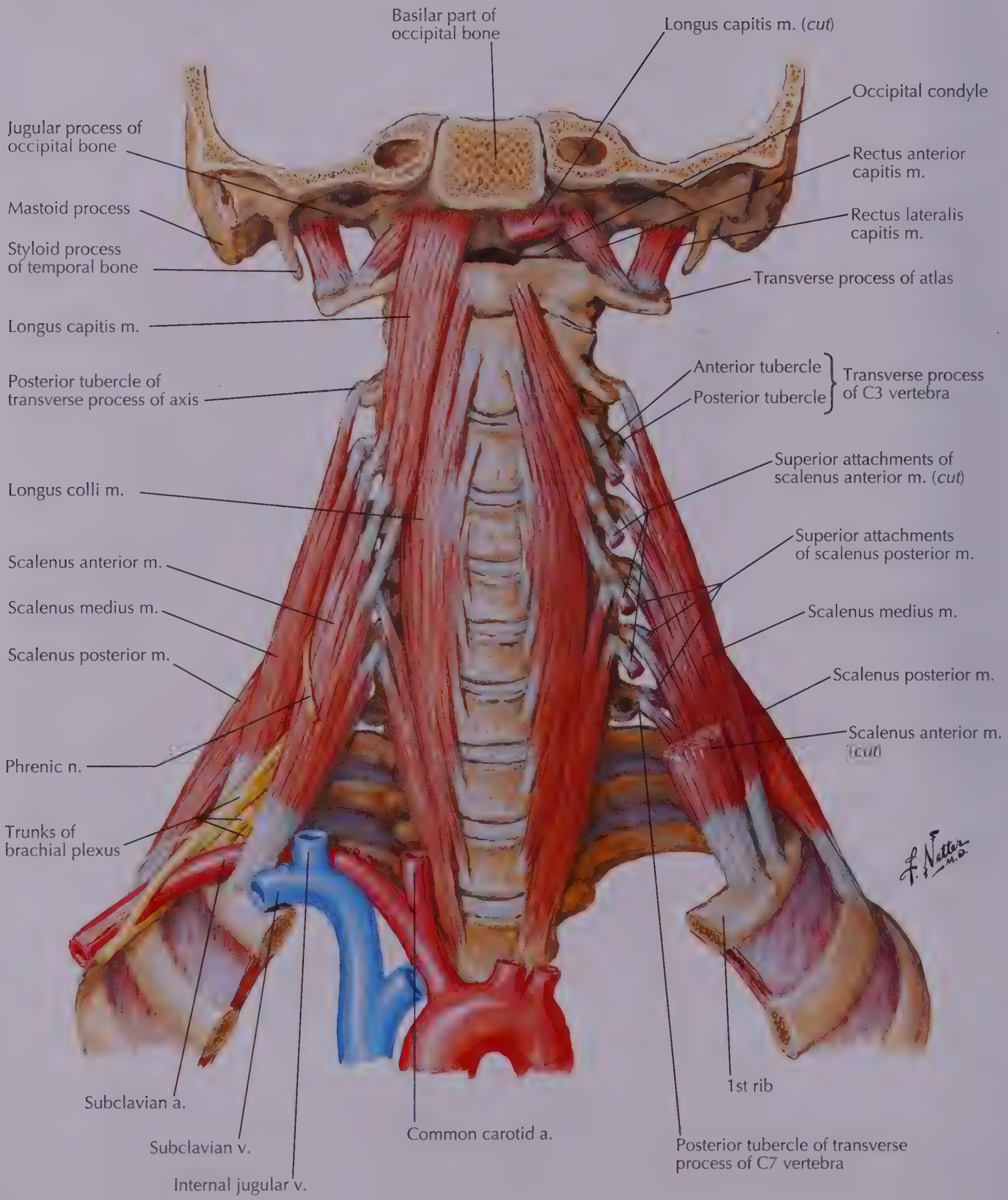

Hyoid bone
Thyrohyoid membrane
External carotid a.
Internal jugular v.
Thyrohyoid m.
Thyroid cartilage
Superior belly of omohyoid m.
Sternohyoid m.
Median cricothyroid ligament
Cricoid cartilage
Scalenus medius m.
Trapezius m.
Inferior belly of omohyoid m.
Trachea
Anterior belly of digastric m.
Mylohyoid m.
Hyoglossus m.
Stylohyoid m.
Posterior belly of digastric m.
Trochlea for intermediate tendon of digastric m.
Superior belly of omohyoid m. (*cut*)
Sternohyoid m. (*cut*)
Thyrohyoid m.
Oblique line of thyroid cartilage
Cricothyroid m.
Sternothyroid m.
Superior belly of omohyoid m. (*cut*)
Thyroid gland
Sternohyoid m. (*cut*)
Clavicle
F. Netter M.D.

Muscles of Neck: Lateral View

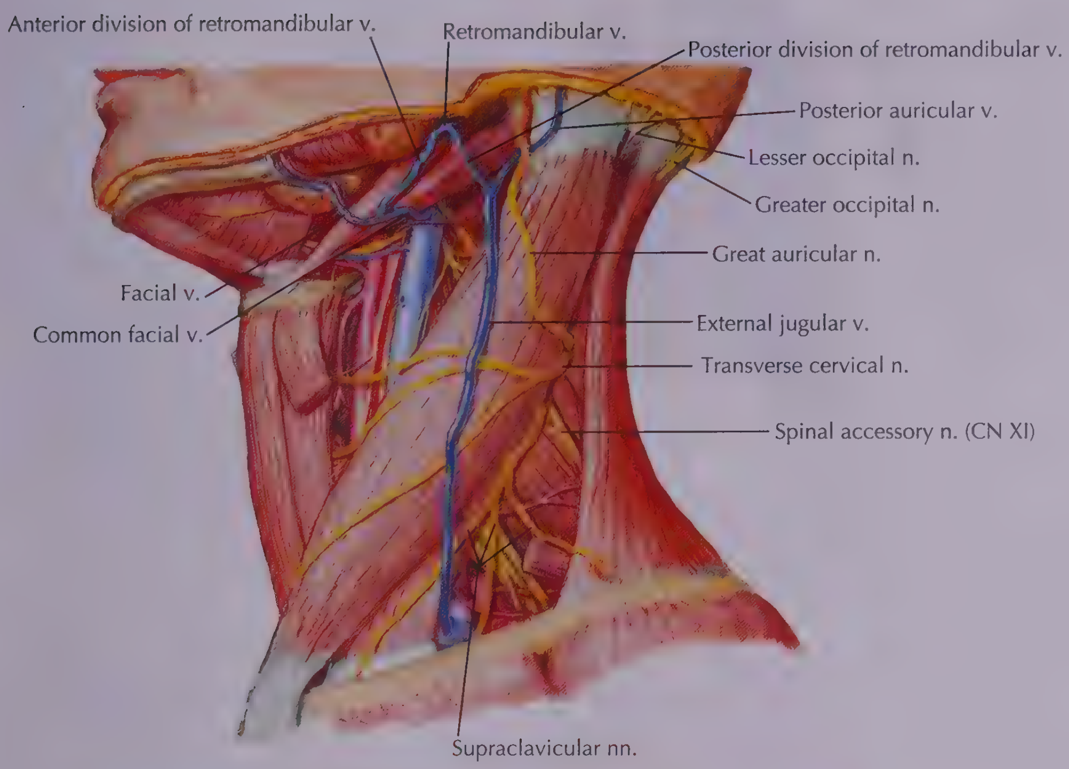
See also Plates 49, 50, 53

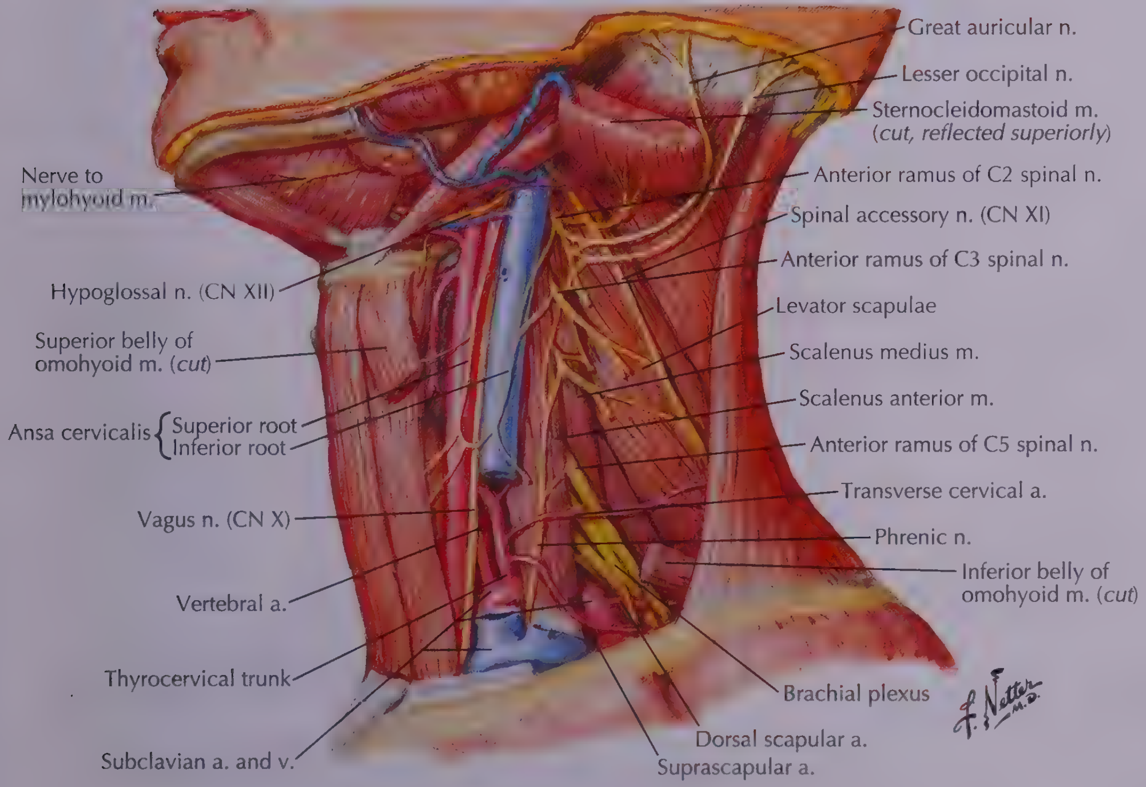

Parotid gland (*cut*)
Masseter
Ramus of mandible
Submandibular gland
Hyoglossus m.
Mylohyoid m.
Mastoid process
Styloid process of temporal bone
Stylohyoid m.
Posterior belly of digastric m.
Middle pharyngeal constrictor
Longus capitis m.
Splenius capitis m.
Sternocleidomastoid m.
Levator scapulae
Scalenus posterior m.
Scalenus medius m.
Scalenus anterior m.
Brachial plexus
Trapezius m.
Acromion
Deltoid m.
Body of mandible
Anterior belly of digastric m.
Hyoid bone
Thyrohyoid m.
Superior belly of omohyoid m.
Sternohyoid m.
Inferior pharyngeal constrictor
Sternothyroid m.
Manubrium of sternum
Inferior belly of omohyoid m.
Clavicle
Pectoralis major m.
Sternal head
Clavicular head
Sternocleidomastoid m.
F. Netter M.D.

Anterior and Lateral Cervical Muscles

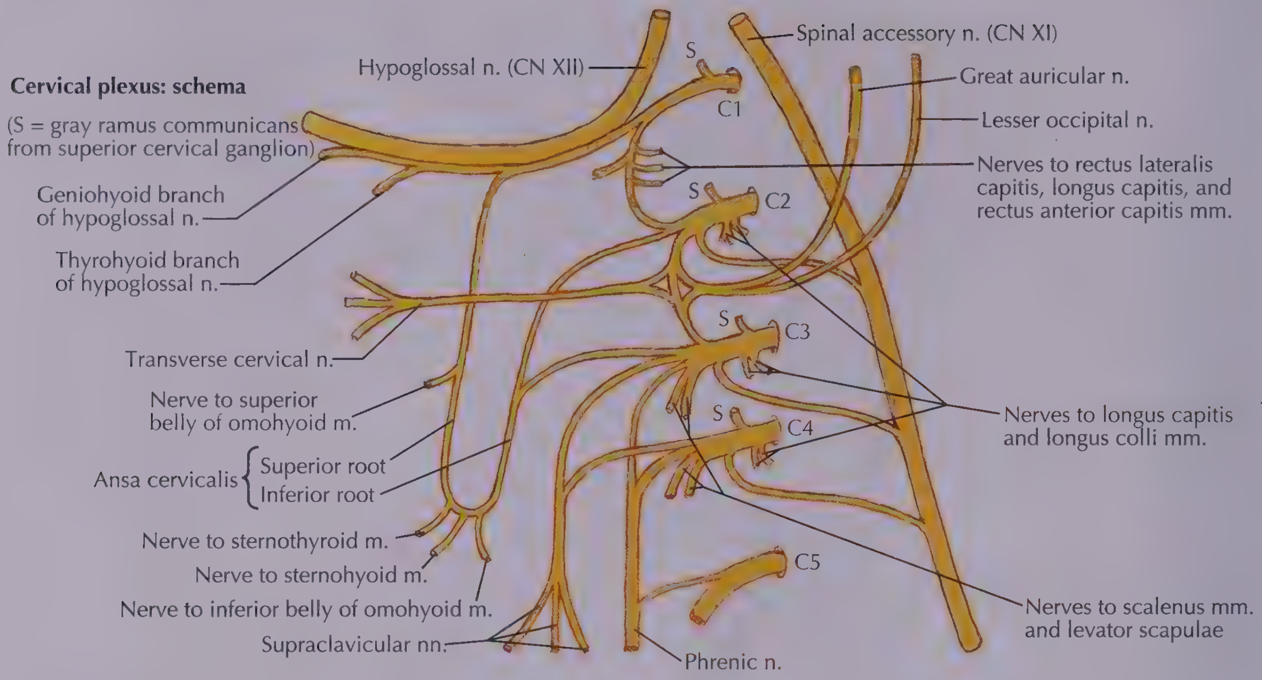

Basilar part of occipital bone
Longus capitis m. (*cut*)
Occipital condyle
Jugular process of occipital bone
Rectus anterior capitis m.
Mastoid process
Rectus lateralis capitis m.
Styloid process of temporal bone
Transverse process of atlas
Longus capitis m.
Anterior tubercle
Posterior tubercle
Transverse process of C3 vertebra
Posterior tubercle of transverse process of axis
Superior attachments of scalenus anterior m. (*cut*)
Longus colli m.
Superior attachments of scalenus posterior m.
Scalenus anterior m.
Scalenus medius m.
Scalenus medius m.
Scalenus posterior m.
Scalenus posterior m.
Scalenus anterior m. (cut)
Phrenic n.
Trunks of brachial plexus
F. Netter M.D.
1st rib
Subclavian a.
Subclavian v.
Common carotid a.
Posterior tubercle of transverse process of C7 vertebra
Internal jugular v.

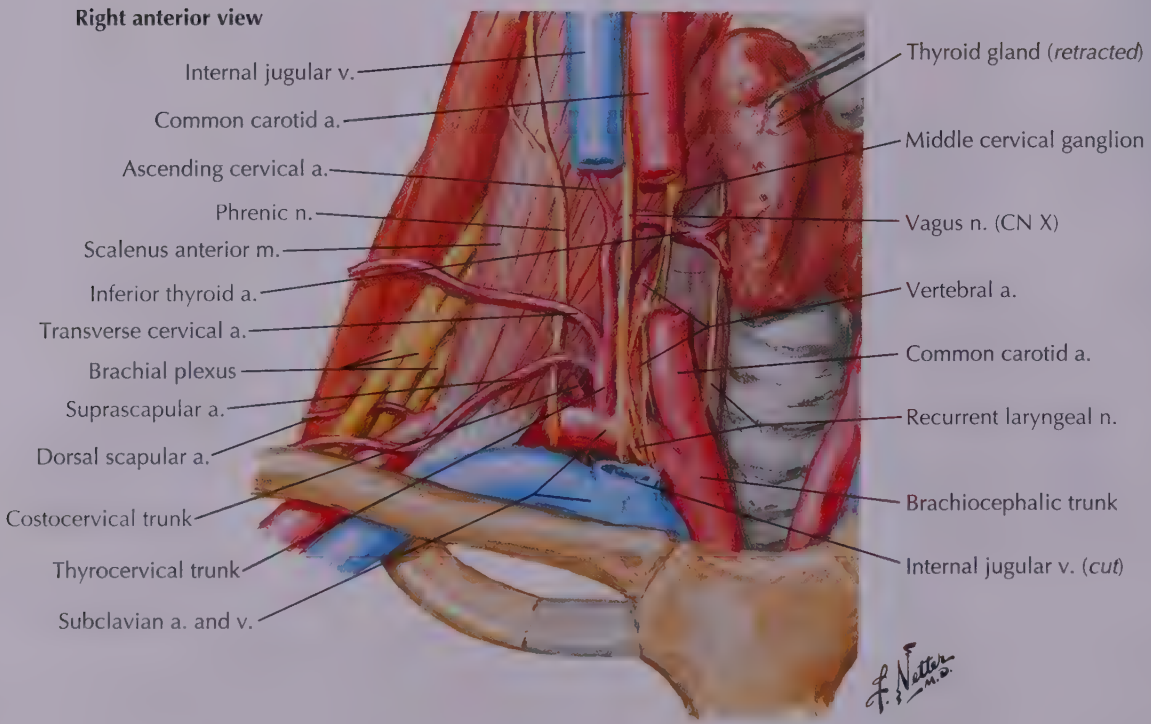
See also Plates 154, 155, 156


Anterior division of retromandibular v.
Retromandibular v.
Posterior division of retromandibular v.
Posterior auricular v.
Lesser occipital n.
Greater occipital n.
Great auricular n.
Facial v.
Common facial v.
External jugular v.
Transverse cervical n.
Spinal accessory n. (CN XI)
Supraclavicular nn.

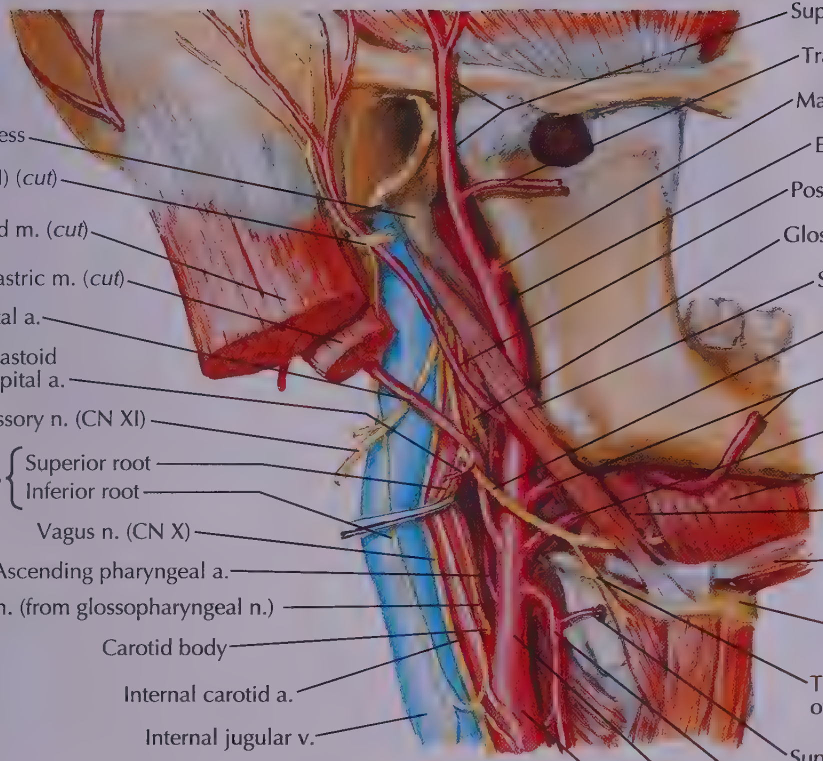

Great auricular n.
Lesser occipital n.
Sternocleidomastoid m. (*cut, reflected superiorly*)
Nerve to mylohyoid m.
Anterior ramus of C2 spinal n.
Spinal accessory n. (CN XI)
Anterior ramus of C3 spinal n.
Hypoglossal n. (CN XII)
Levator scapulae
Superior belly of omohyoid m. (*cut*)
Scalenus medius m.
Scalenus anterior m.
Ansa cervicalis
Superior root
Inferior root
Anterior ramus of C5 spinal n.
Transverse cervical a.
Vagus n. (CN X)
Phrenic n.
Inferior belly of omohyoid m. (*cut*)
Vertebral a.
Thyrocervical trunk
Brachial plexus
F. Netter M.D.
Dorsal scapular a.
Suprascapular a.
Subclavian a. and v.

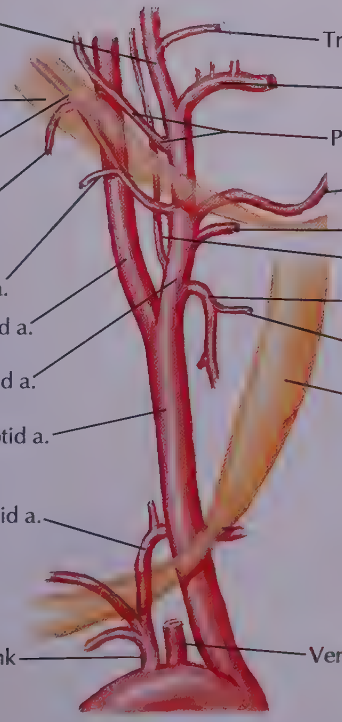
See also Plate 156


Cervical plexus: schema
(S = gray ramus communicans from superior cervical ganglion)
Hypoglossal n. (CN XII)
S
C1
Spinal accessory n. (CN XI)
Great auricular n.
Lesser occipital n.
Nerves to rectus lateralis capitis, longus capitis, and rectus anterior capitis mm.
Geniohyoid branch of hypoglossal n.
Thyrohyoid branch of hypoglossal n.
S
C2
S
C3
Transverse cervical n.
Nerve to superior belly of omohyoid m.
Nerves to longus capitis and longus colli mm.
S
C4
Ansa cervicalis
Superior root
Inferior root
Nerve to sternothyroid m.
Nerve to sternohyoid m.
Nerve to inferior belly of omohyoid m.
C5
Nerves to scalenus mm. and levator scapulae
Supraclavicular nn.
Phrenic n.


Right anterior view
Internal jugular v.
Common carotid a.
Ascending cervical a.
Phrenic n.
Scalenus anterior m.
Inferior thyroid a.
Transverse cervical a.
Brachial plexus
Suprascapular a.
Dorsal scapular a.
Costocervical trunk
Thyrocervical trunk
Subclavian a. and v.
Thyroid gland (*retracted*)
Middle cervical ganglion
Vagus n. (CN X)
Vertebral a.
Common carotid a.
Recurrent laryngeal n.
Brachiocephalic trunk
Internal jugular v. (*cut*)
F. Netter M.D.

Retromandibular space: right lateral view


Styloid process
Facial n. (CN VII) (*cut*)
Sternocleidomastoid m. (*cut*)
Posterior belly of digastric m. (*cut*)
Occipital a.
Sternocleidomastoid branch of occipital a.
Spinal accessory n. (CN XI)
Ansa cervicalis
Superior root
Inferior root
Vagus n. (CN X)
Ascending pharyngeal a.
Carotid sinus n. (from glossopharyngeal n.)
Carotid body
Internal carotid a.
Internal jugular v.
Superficial temporal a.
Transverse facial a.
Maxillary a.
External carotid a.
Posterior auricular a.
Glossopharyngeal n. (CN IX)
Stylohyoid m.
Hypoglossal n. (CN XII)
Facial a.
Lingual a.
Mylohyoid m.
Hyoglossus m.
Anterior belly of digastric m.
Hyoid bone
Thyrohyoid branch of hypoglossal n.
Superior laryngeal a.
Superior thyroid a.
External carotid a.
Common carotid a.


Superficial temporal a.
Posterior belly of digastric m. (*phantom*)
Occipital a.
Descending branch of occipital a.
Sternocleidomastoid branch of occipital a.
Internal carotid a.
External carotid a.
Common carotid a.
Inferior thyroid a.
Thyrocervical trunk
Transverse facial a.
Maxillary a.
Posterior auricular a.
Facial a.
Lingual a.
Ascending pharyngeal a.
Superior thyroid a.
Superior laryngeal a.
Superior belly of omohyoid m. (*phantom*)
Vertebral a.

Right external carotid artery branches: schema

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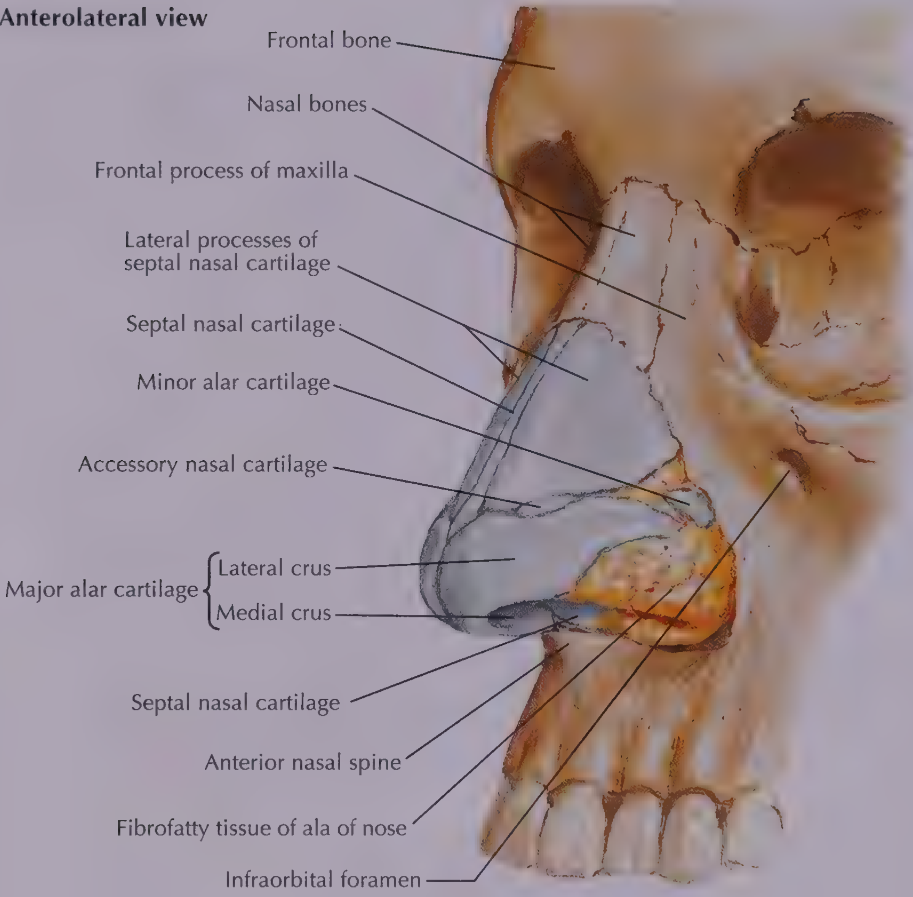
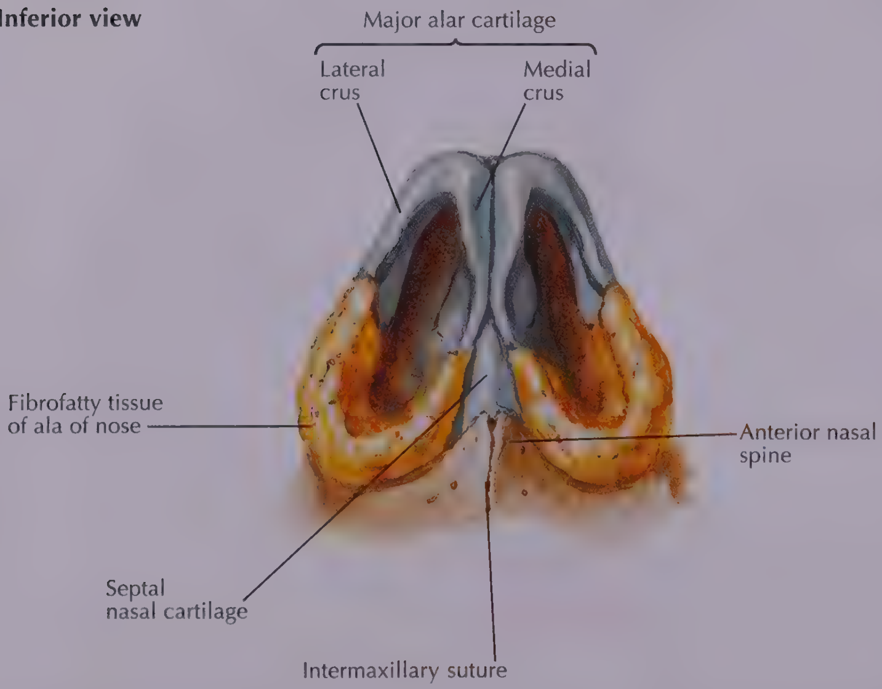
Skeleton of Nose

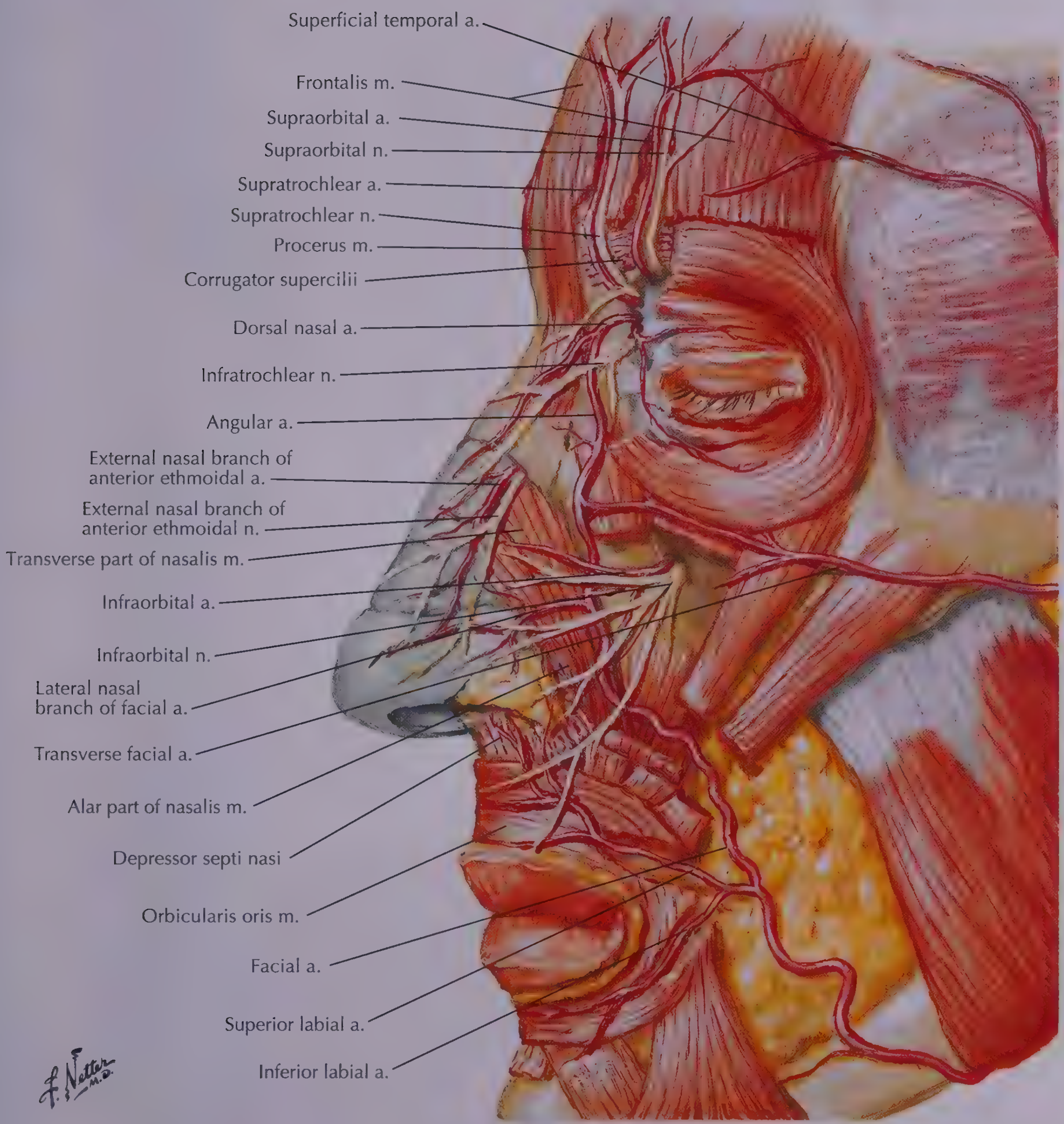
See also Plate 63

Anterolateral view

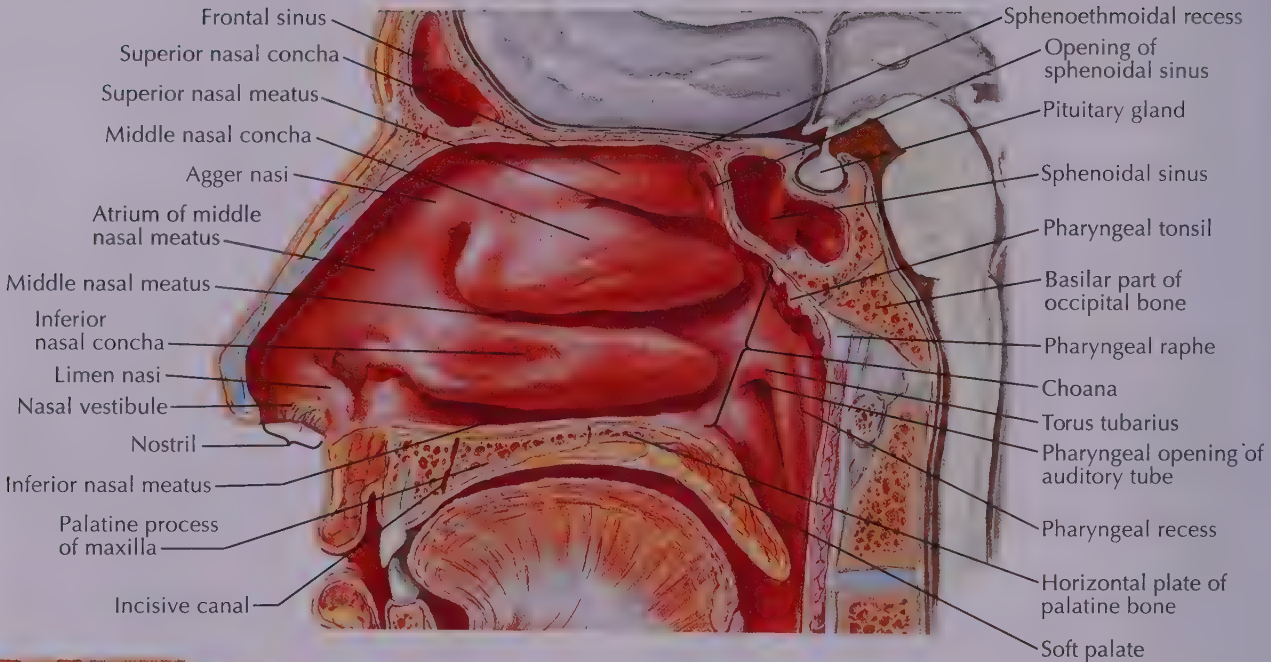

Frontal bone
Nasal bones
Frontal process of maxilla
Lateral processes of septal nasal cartilage
Septal nasal cartilage
Minor alar cartilage
Accessory nasal cartilage
Major alar cartilage
Lateral crus
Medial crus
Septal nasal cartilage
Anterior nasal spine
Fibrofatty tissue of ala of nose
Infraorbital foramen

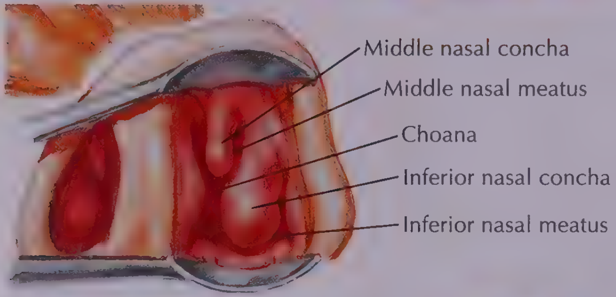
Inferior view


Major alar cartilage
Lateral crus
Medial crus
Fibrofatty tissue of ala of nose
Anterior nasal spine
Septal nasal cartilage
Intermaxillary suture

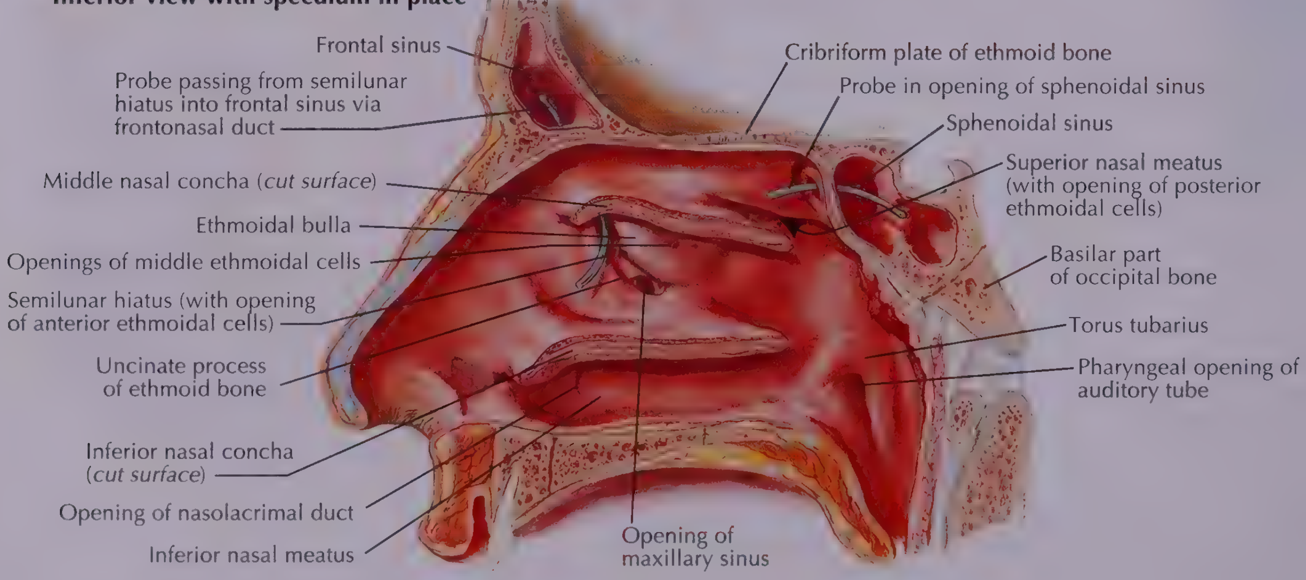

Superficial temporal a.
Frontalis m.
Supraorbital a.
Supraorbital n.
Supratrochlear a.
Supratrochlear n.
Procerus m.
Corrugator supercilii
Dorsal nasal a.
Infratrochlear n.
Angular a.
External nasal branch of anterior ethmoidal a.
External nasal branch of anterior ethmoidal n.
Transverse part of nasalis m.
Infraorbital a.
Infraorbital n.
Lateral nasal branch of facial a.
Transverse facial a.
Alar part of nasalis m.
Depressor septi nasi
Orbicularis oris m.
Facial a.
Superior labial a.
Inferior labial a.
F. Netter M.D.

Lateral Wall of Nasal Cavity


Frontal sinus
Superior nasal concha
Superior nasal meatus
Middle nasal concha
Agger nasi
Atrium of middle nasal meatus
Middle nasal meatus
Inferior nasal concha
Limen nasi
Nasal vestibule
Nostril
Inferior nasal meatus
Palatine process of maxilla
Incisive canal
Sphenoethmoidal recess
Opening of sphenoidal sinus
Pituitary gland
Sphenoidal sinus
Pharyngeal tonsil
Basilar part of occipital bone
Pharyngeal raphe
Choana
Torus tubarius
Pharyngeal opening of auditory tube
Pharyngeal recess
Horizontal plate of palatine bone
Soft palate

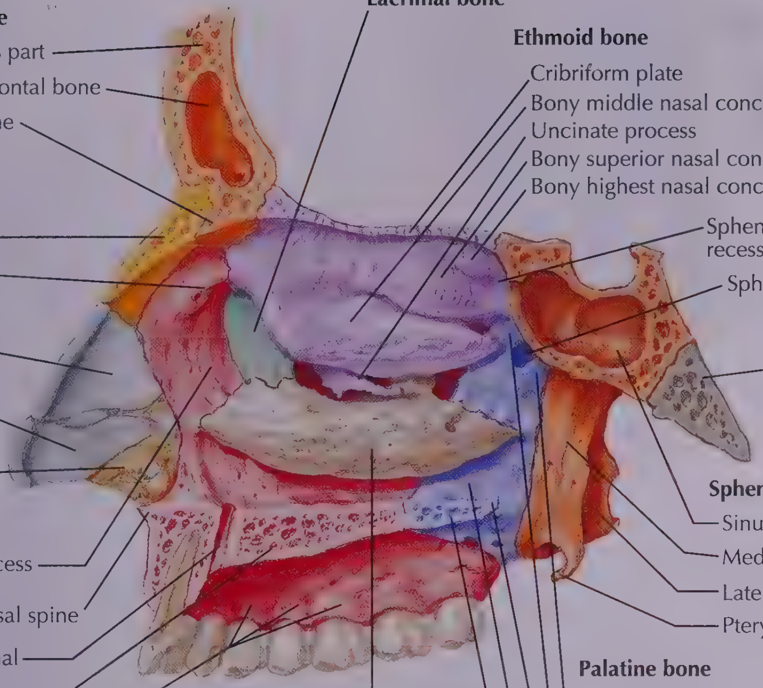

Middle nasal concha
Middle nasal meatus
Choana
Inferior nasal concha
Inferior nasal meatus

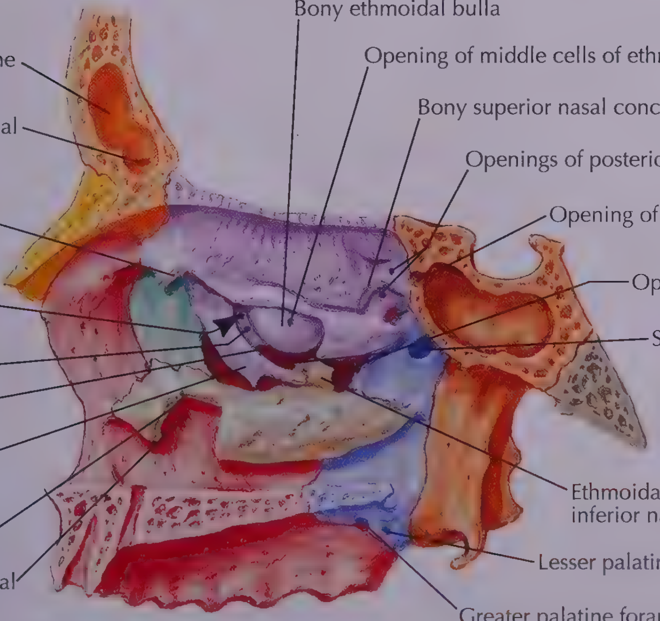
Inferior view with speculum in place


Frontal sinus
Probe passing from semilunar hiatus into frontal sinus via frontonasal duct
Middle nasal concha (*cut surface*)
Ethmoidal bulla
Openings of middle ethmoidal cells
Semilunar hiatus (with opening of anterior ethmoidal cells)
Uncinate process of ethmoid bone
Inferior nasal concha (*cut surface*)
Opening of nasolacrimal duct
Inferior nasal meatus
Opening of maxillary sinus
Cribriform plate of ethmoid bone
Probe in opening of sphenoidal sinus
Sphenoidal sinus
Superior nasal meatus (with opening of posterior ethmoidal cells)
Basilar part of occipital bone
Torus tubarius
Pharyngeal opening of auditory tube

Lateral Wall of Nasal Cavity of Cranium

See also Plates 61, 63


Frontal bone
Squamous part
Sinus of frontal bone
Nasal spine
Nasal bone
Agger nasi
Lateral process of nasal septal cartilage
Major alar cartilage
Fibrofatty tissue of ala of nose
Maxilla
Frontal process
Anterior nasal spine
Incisive canal
Palatine process
Alveolar process
Inferior nasal concha bone
Lacrimal bone
Ethmoid bone
Cribriform plate
Bony middle nasal concha
Uncinate process
Bony superior nasal concha
Bony highest nasal concha
Sphenoethmoidal recess of cranium
Sphenopalatine foramen
Basilar part of occipital bone
Sphenoid bone
Sinus of sphenoid bone
Medial pterygoid plate
Lateral pterygoid plate
Pterygoid hamulus
Palatine bone
Sphenoidal process
Orbital process
Posterior nasal spine
Perpendicular plate
Horizontal plate


Sinus of frontal bone
Opening of frontonasal canal
Bony middle nasal concha (cut away)
Infundibulum leading to frontonasal canal
Opening of anterior cells of ethmoid bone
Bony semilunar hiatus
Uncinate process of ethmoid bone
Inferior nasal concha bone (cut away)
Opening of nasolacrimal canal
Bony ethmoidal bulla
Opening of middle cells of ethmoid bone
Bony superior nasal concha (cut away)
Openings of posterior cells of ethmoid bone
Opening of sinus of sphenoid bone
Opening of sinus of maxilla
Sphenopalatine foramen
Ethmoidal process of inferior nasal concha bone
Lesser palatine foramen
Greater palatine foramen

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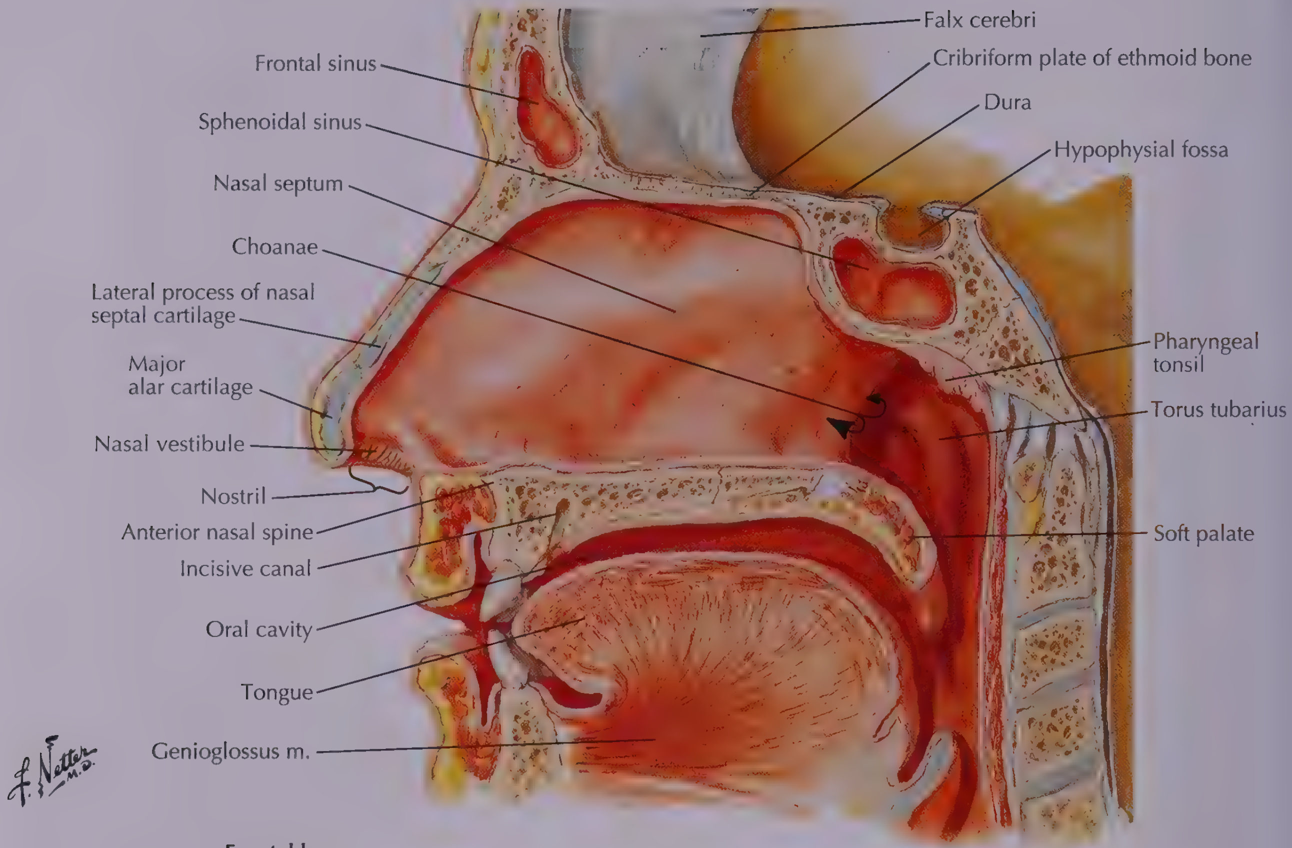
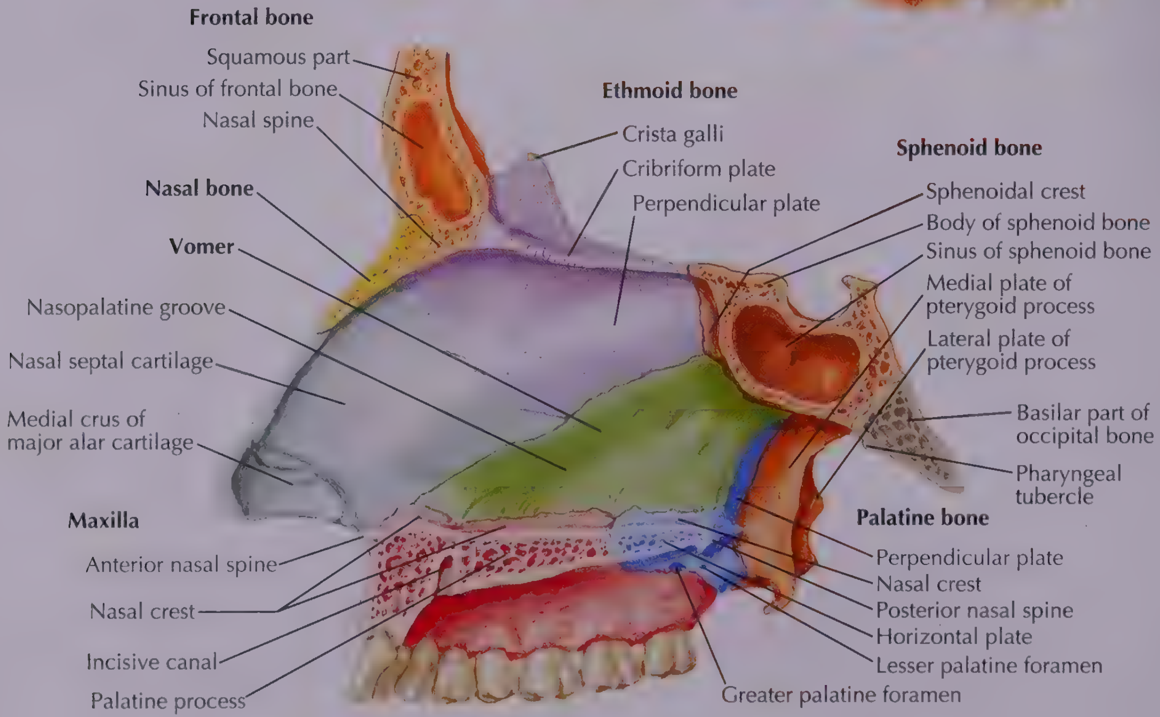
Medial Wall of Nasal Cavity (Nasal Septum)

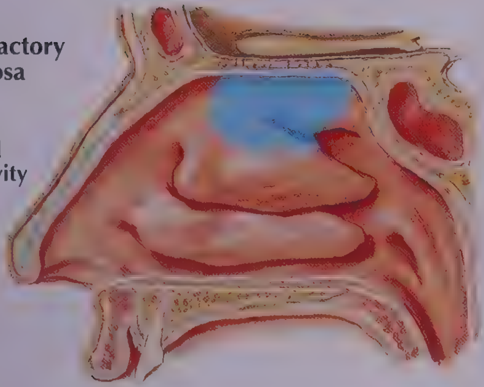
See also Plate 29

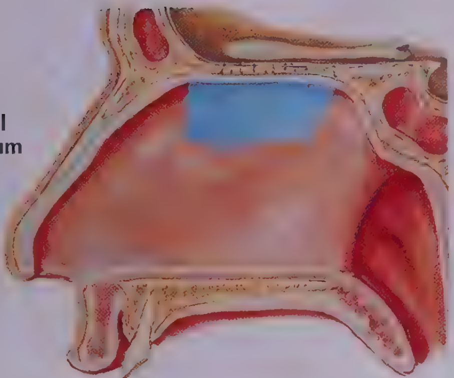

Falx cerebri
Frontal sinus
Cribriform plate of ethmoid bone
Dura
Sphenoidal sinus
Hypophysial fossa
Nasal septum
Choanae
Lateral process of nasal septal cartilage
Pharyngeal tonsil
Major alar cartilage
Torus tubarius
Nasal vestibule
Nostril
Anterior nasal spine
Soft palate
Incisive canal
Oral cavity
Tongue
Genioglossus m.

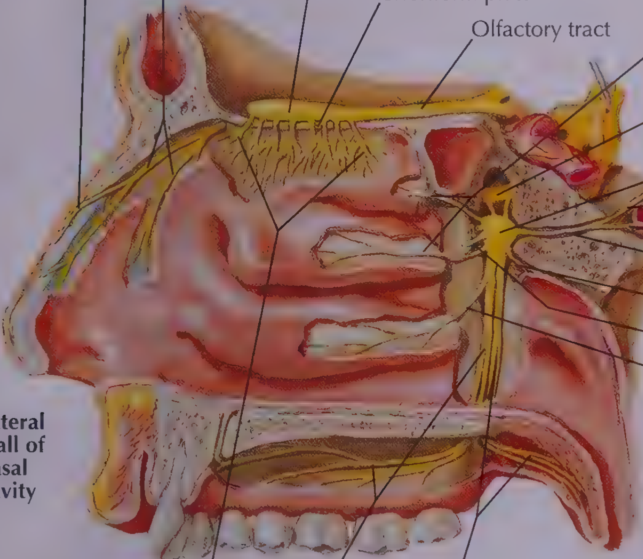

Frontal bone
Squamous part
Sinus of frontal bone
Nasal spine
Ethmoid bone
Crista galli
Cribriform plate
Perpendicular plate
Sphenoid bone
Nasal bone
Sphenoidal crest
Body of sphenoid bone
Vomer
Sinus of sphenoid bone
Medial plate of pterygoid process
Nasopalatine groove
Lateral plate of pterygoid process
Nasal septal cartilage
Medial crus of major alar cartilage
Basilar part of occipital bone
Pharyngeal tubercle
Maxilla
Palatine bone
Perpendicular plate
Anterior nasal spine
Nasal crest
Nasal crest
Posterior nasal spine
Horizontal plate
Incisive canal
Lesser palatine foramen
Palatine process
Greater palatine foramen

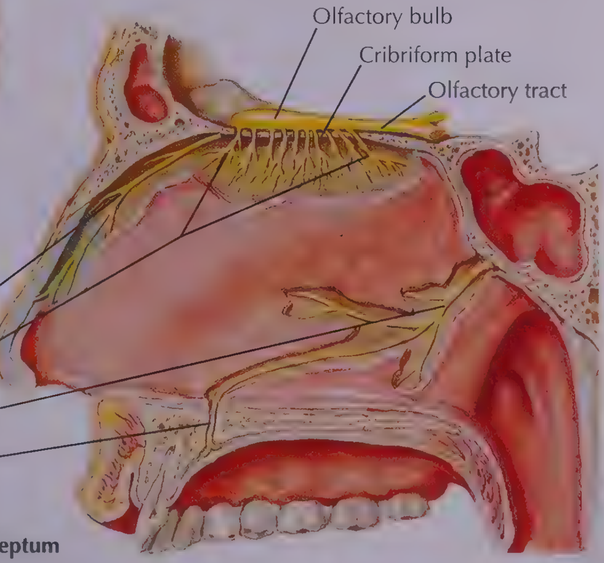
Nerves of Nasal Cavity

See also Plates 40, 81, 146


Distribution of olfactory part of nasal mucosa (*shaded blue*)
Lateral wall of nasal cavity

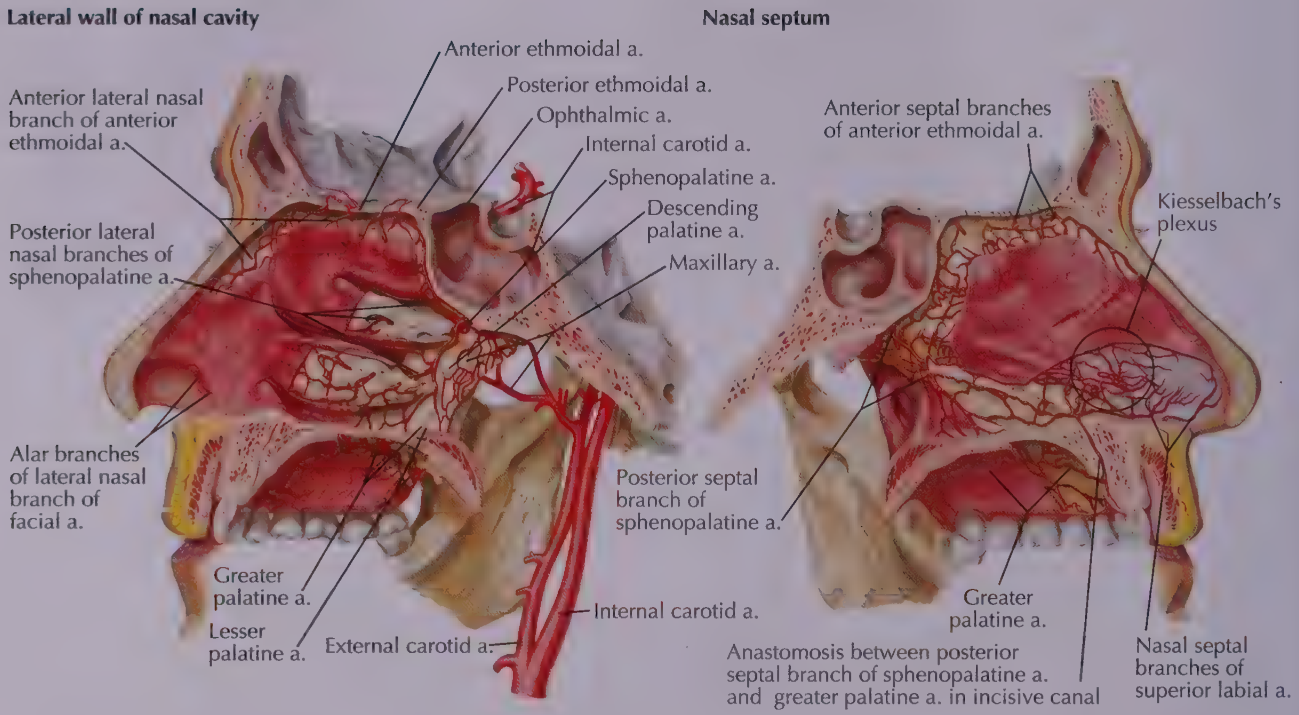

Nasal septum

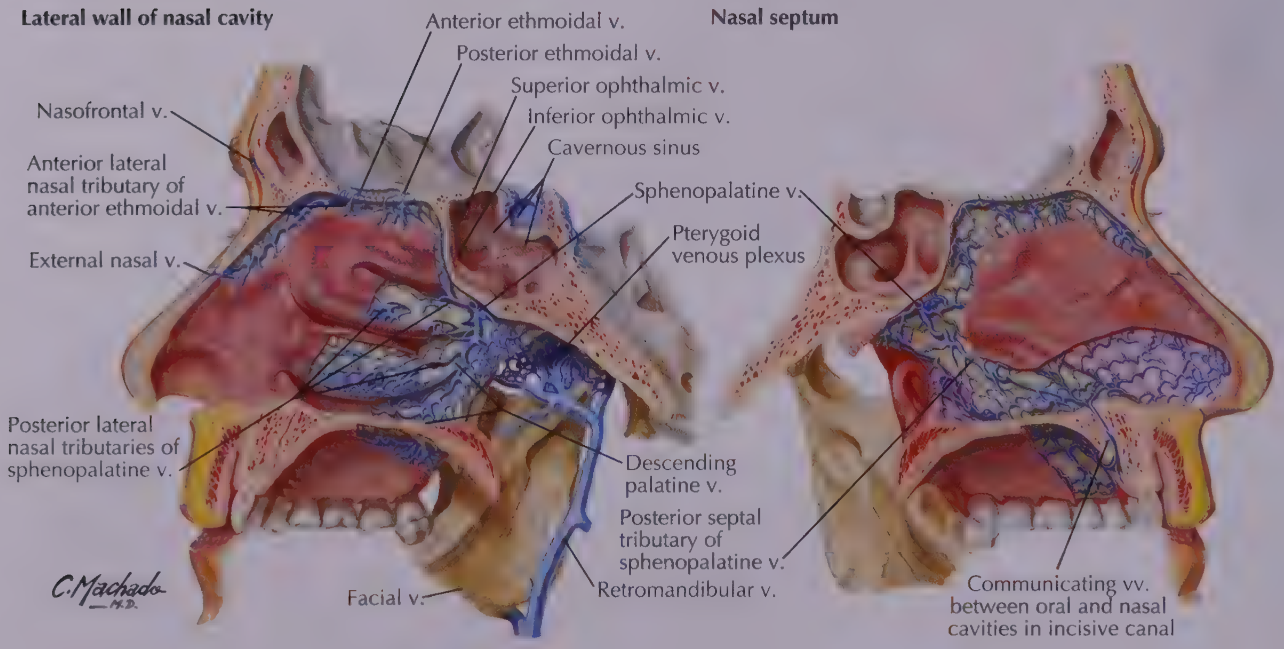

External nasal branch of anterior ethmoidal n.
Lateral nasal branches of anterior ethmoidal n.
Olfactory bulb
Cribriform plate
Olfactory tract
Lateral superior posterior nasal branches of maxillary n.
Maxillary n. (CN V_2) (sphenopalatine foramen dissected away)
Pterygopalatine ganglion
Greater petrosal n.
Deep petrosal n.
Nerve of pterygoid canal (Vidian n.)
Pharyngeal n.
Nasopalatine n. (*cut*)
Inferior posterior nasal branch of greater palatine n.
Lateral wall of nasal cavity
Olfactory n. (CN I)
Greater palatine n.
Lesser palatine nn.


Olfactory bulb
Cribriform plate
Olfactory tract
Medial nasal branch of anterior ethmoidal n.
Olfactory n. (CN I)
Nasopalatine n.
Incisive canal
Nasal septum

F. Netter M.D.

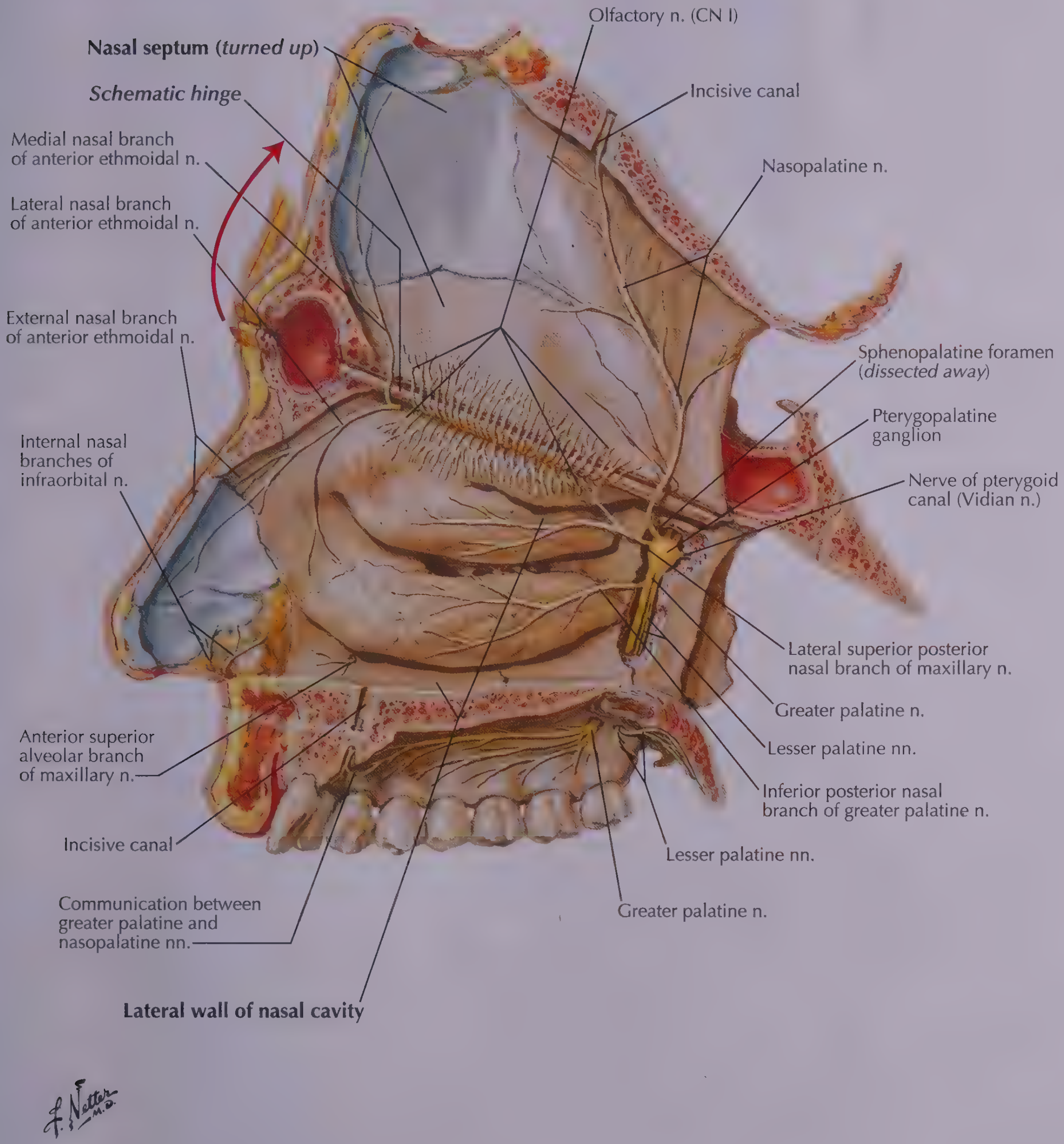
Vasculature of Nasal Cavity


Lateral wall of nasal cavity
Nasal septum
Anterior ethmoidal a.
Posterior ethmoidal a.
Ophthalmic a.
Internal carotid a.
Sphenopalatine a.
Descending palatine a.
Maxillary a.
Anterior lateral nasal branch of anterior ethmoidal a.
Posterior lateral nasal branches of sphenopalatine a.
Alar branches of lateral nasal branch of facial a.
Greater palatine a.
Lesser palatine a.
External carotid a.
Internal carotid a.
Posterior septal branch of sphenopalatine a.
Anterior septal branches of anterior ethmoidal a.
Kiesselbach's plexus
Greater palatine a.
Anastomosis between posterior septal branch of sphenopalatine a. and greater palatine a. in incisive canal
Nasal septal branches of superior labial a.

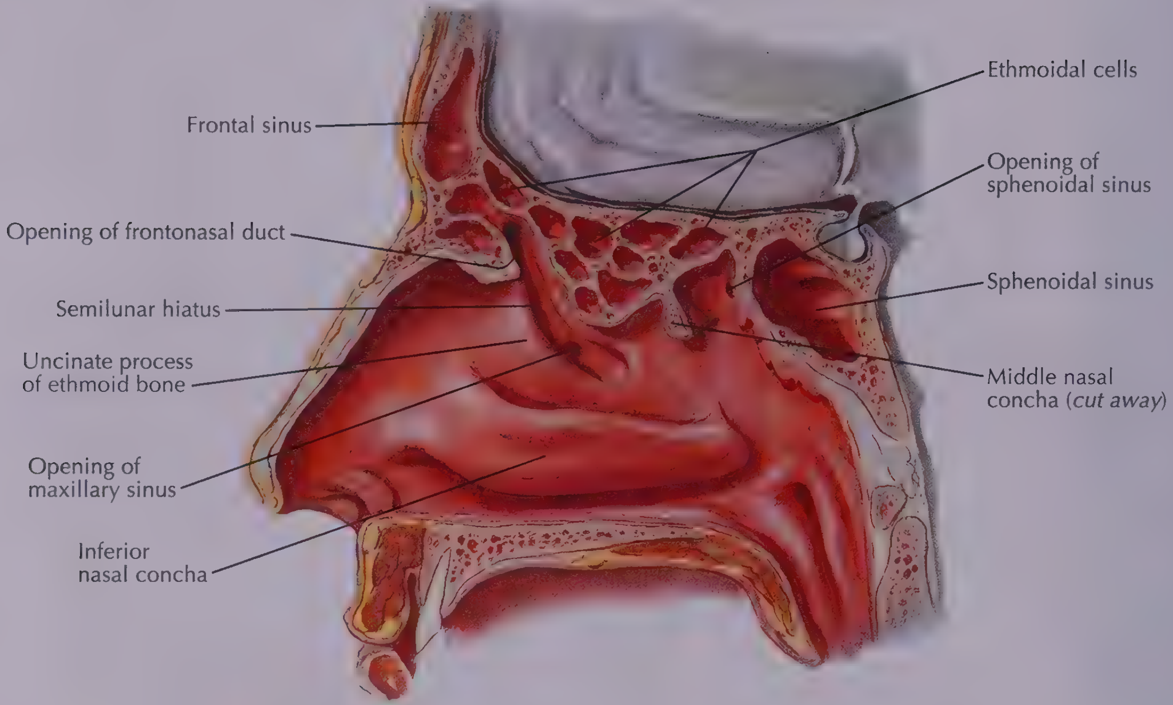

Lateral wall of nasal cavity
Nasal septum
Anterior ethmoidal v.
Posterior ethmoidal v.
Superior ophthalmic v.
Inferior ophthalmic v.
Cavernous sinus
Sphenopalatine v.
Pterygoid venous plexus
Nasofrontal v.
Anterior lateral nasal tributary of anterior ethmoidal v.
External nasal v.
Posterior lateral nasal tributaries of sphenopalatine v.
Descending palatine v.
Posterior septal tributary of sphenopalatine v.
Retromandibular v.
Facial v.
Communicating vv. between oral and nasal cavities in incisive canal
C.Machado M.D.

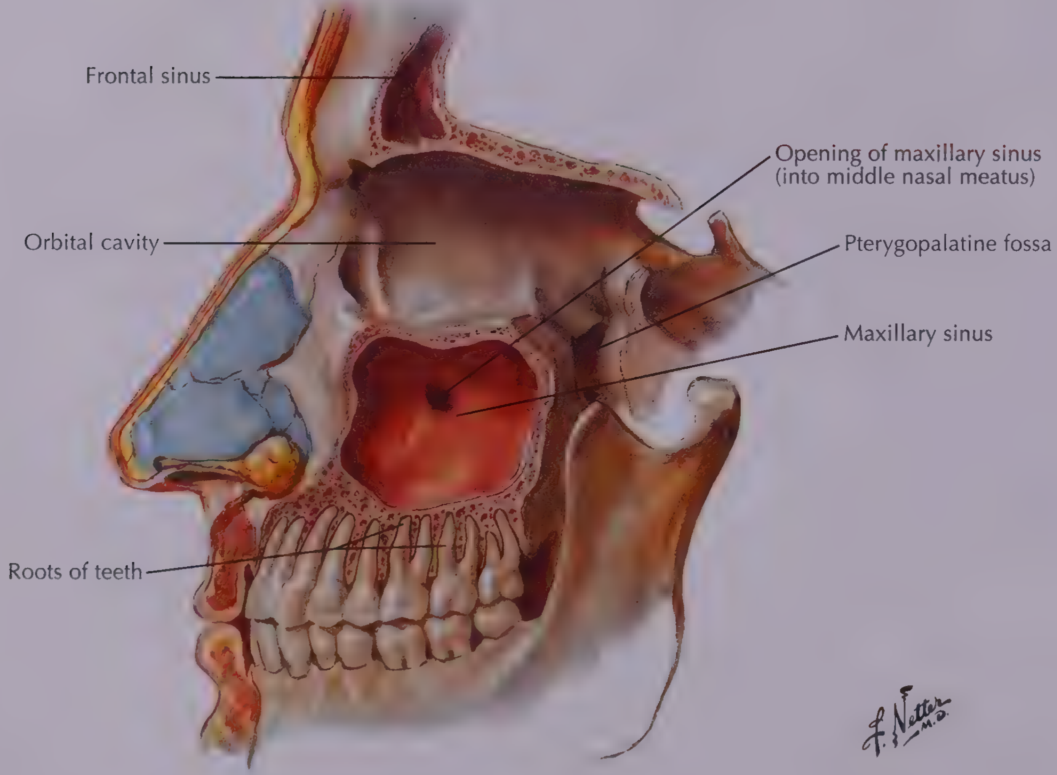
Nerves of Nasal Cavity: Bony Nasal Septum Turned Up

See also Plate 80

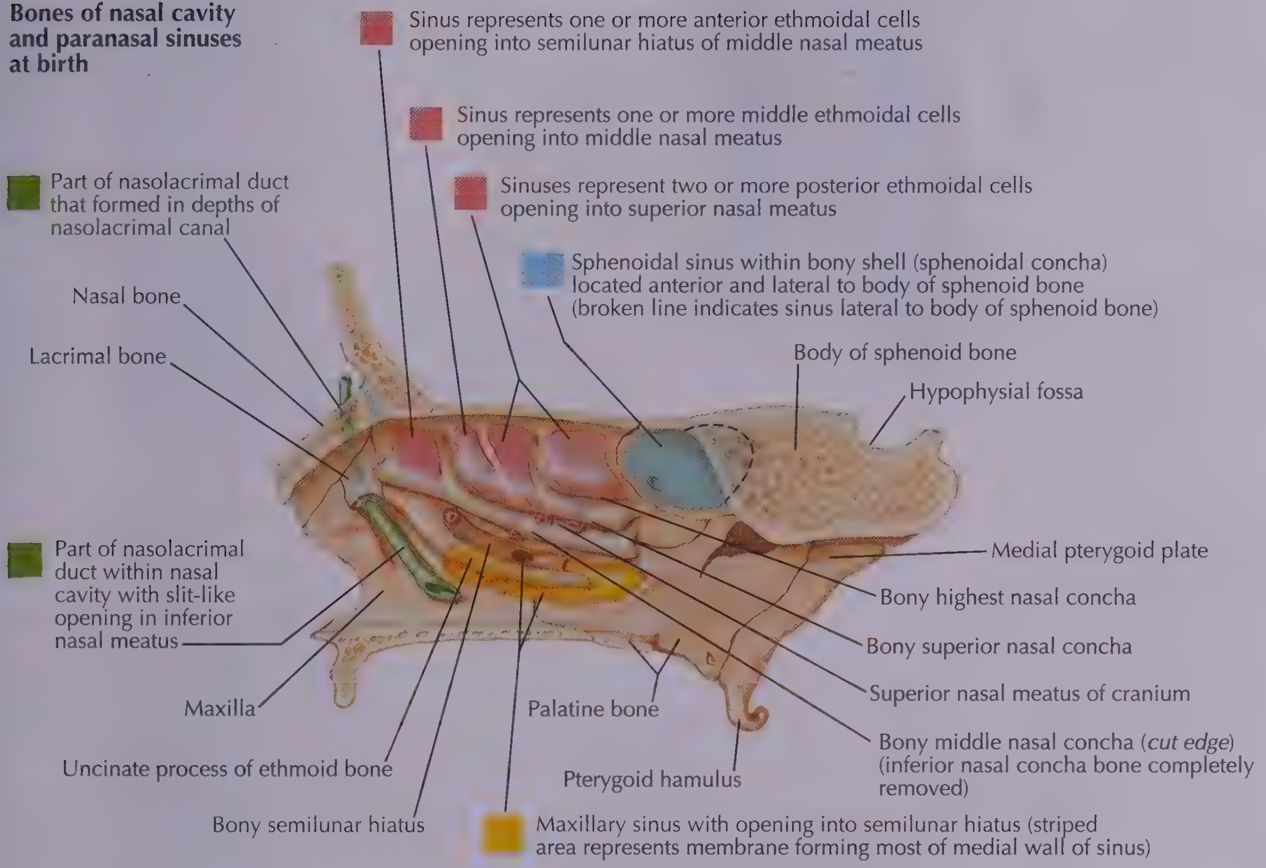

Nasal septum (*turned up*)
Schematic hinge
Medial nasal branch of anterior ethmoidal n.
Lateral nasal branch of anterior ethmoidal n.
External nasal branch of anterior ethmoidal n.
Internal nasal branches of infraorbital n.
Anterior superior alveolar branch of maxillary n.
Incisive canal
Communication between greater palatine and nasopalatine nn.
Lateral wall of nasal cavity
Olfactory n. (CN I)
Incisive canal
Nasopalatine n.
Sphenopalatine foramen (*dissected away*)
Pterygopalatine ganglion
Nerve of pterygoid canal (Vidian n.)
Lateral superior posterior nasal branch of maxillary n.
Greater palatine n.
Lesser palatine nn.
Inferior posterior nasal branch of greater palatine n.
Lesser palatine nn.
Greater palatine n.
F. Netter M.D.

See also Plate 61

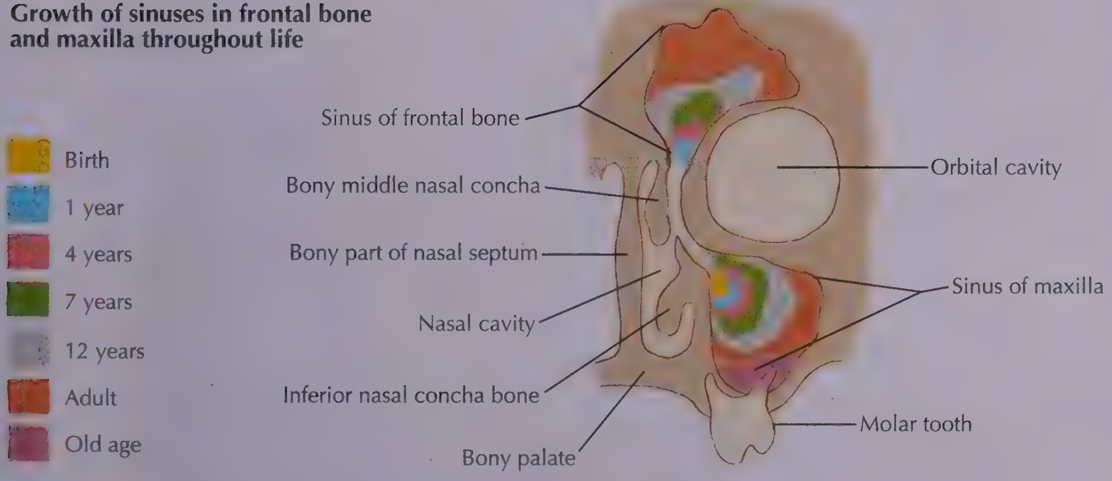

Frontal sinus
Ethmoidal cells
Opening of sphenoidal sinus
Opening of frontonasal duct
Sphenoidal sinus
Semilunar hiatus
Uncinate process of ethmoid bone
Middle nasal concha (*cut away*)
Opening of maxillary sinus
Inferior nasal concha


Frontal sinus
Opening of maxillary sinus (into middle nasal meatus)
Orbital cavity
Pterygopalatine fossa
Maxillary sinus
Roots of teeth
F. Netter M.D.

Bones of nasal cavity and paranasal sinuses at birth


Sinus represents one or more anterior ethmoidal cells opening into semilunar hiatus of middle nasal meatus
Sinus represents one or more middle ethmoidal cells opening into middle nasal meatus
Part of nasolacrimal duct that formed in depths of nasolacrimal canal
Sinuses represent two or more posterior ethmoidal cells opening into superior nasal meatus
Sphenoidal sinus within bony shell (sphenoidal concha) located anterior and lateral to body of sphenoid bone (broken line indicates sinus lateral to body of sphenoid bone)
Nasal bone
Lacrimal bone
Body of sphenoid bone
Hypophysial fossa
Part of nasolacrimal duct within nasal cavity with slit-like opening in inferior nasal meatus
Medial pterygoid plate
Bony highest nasal concha
Bony superior nasal concha
Superior nasal meatus of cranium
Maxilla
Palatine bone
Bony middle nasal concha (*cut edge*) (inferior nasal concha bone completely removed)
Uncinate process of ethmoid bone
Pterygoid hamulus
Bony semilunar hiatus
Maxillary sinus with opening into semilunar hiatus (striped area represents membrane forming most of medial wall of sinus)

Growth of sinuses in frontal bone and maxilla throughout life

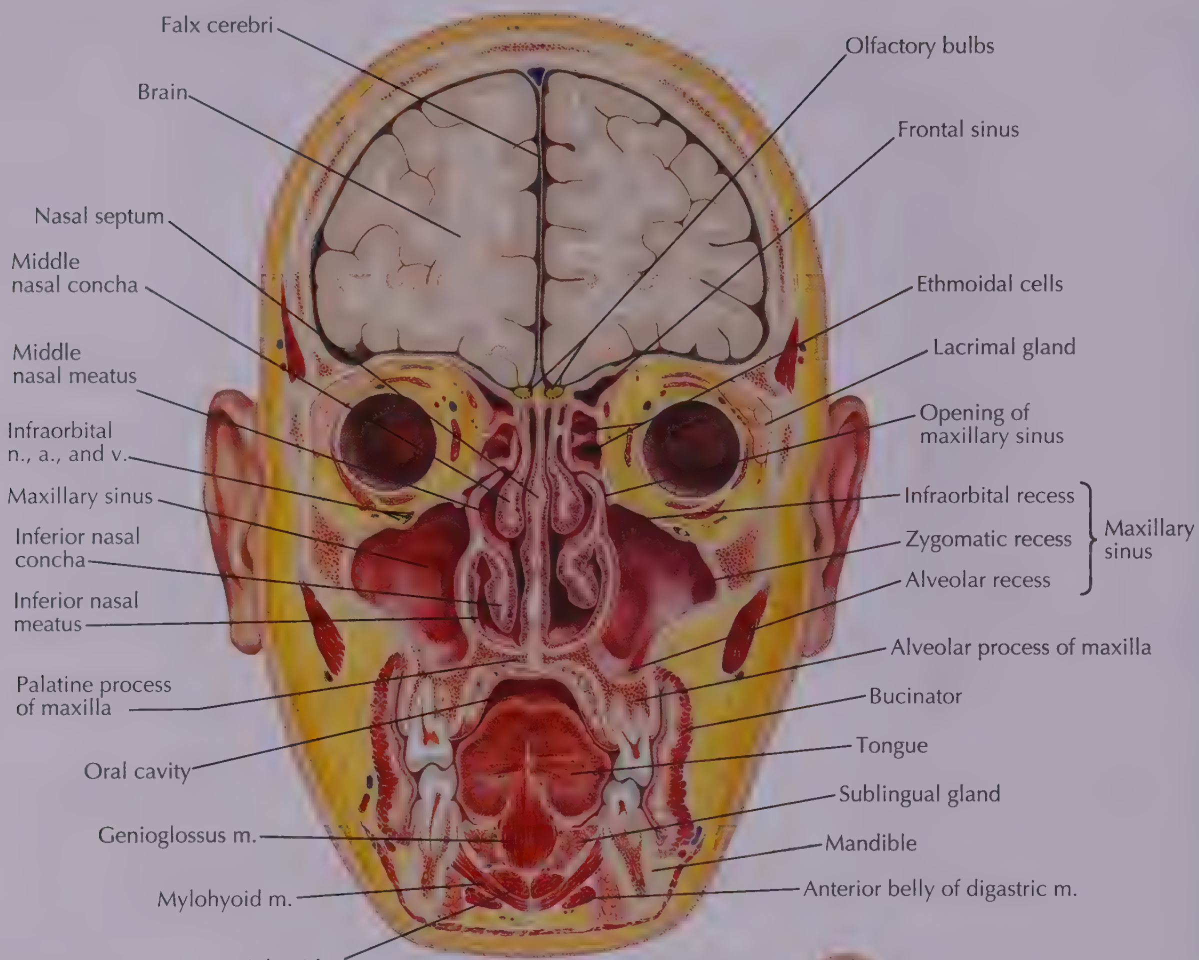

Sinus of frontal bone
Birth
Orbital cavity
Bony middle nasal concha
1 year
4 years
Bony part of nasal septum
Sinus of maxilla
7 years
Nasal cavity
12 years
Adult
Inferior nasal concha bone
Molar tooth
Old age
Bony palate

F. Netter M.D.

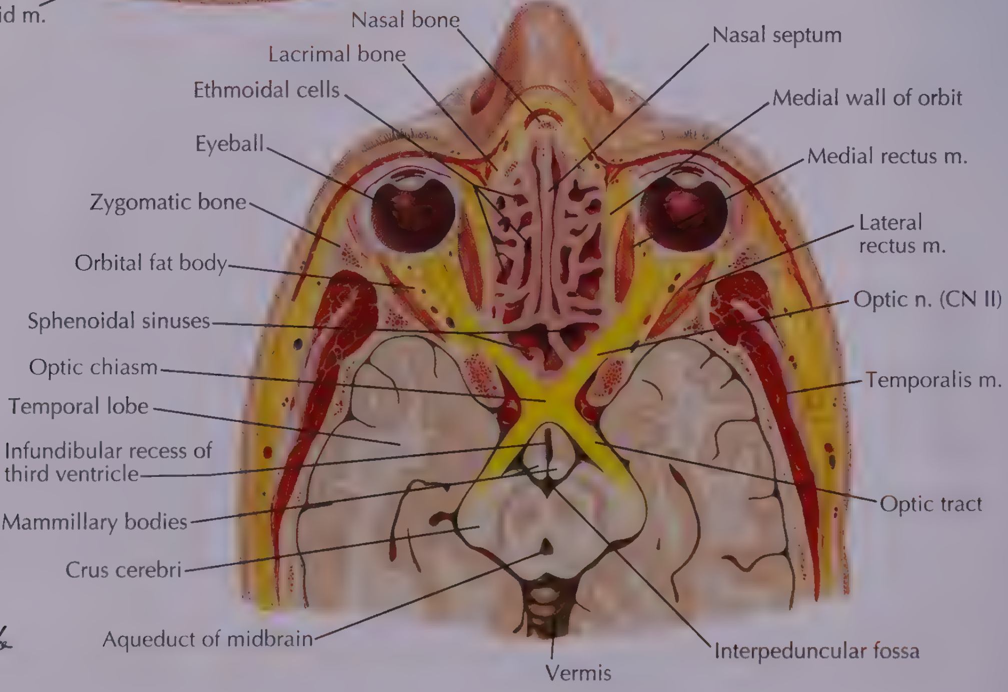
Paranasal Sinuses: Coronal and Transverse Sections

See also Plates BP 22, BP 23

Coronal section

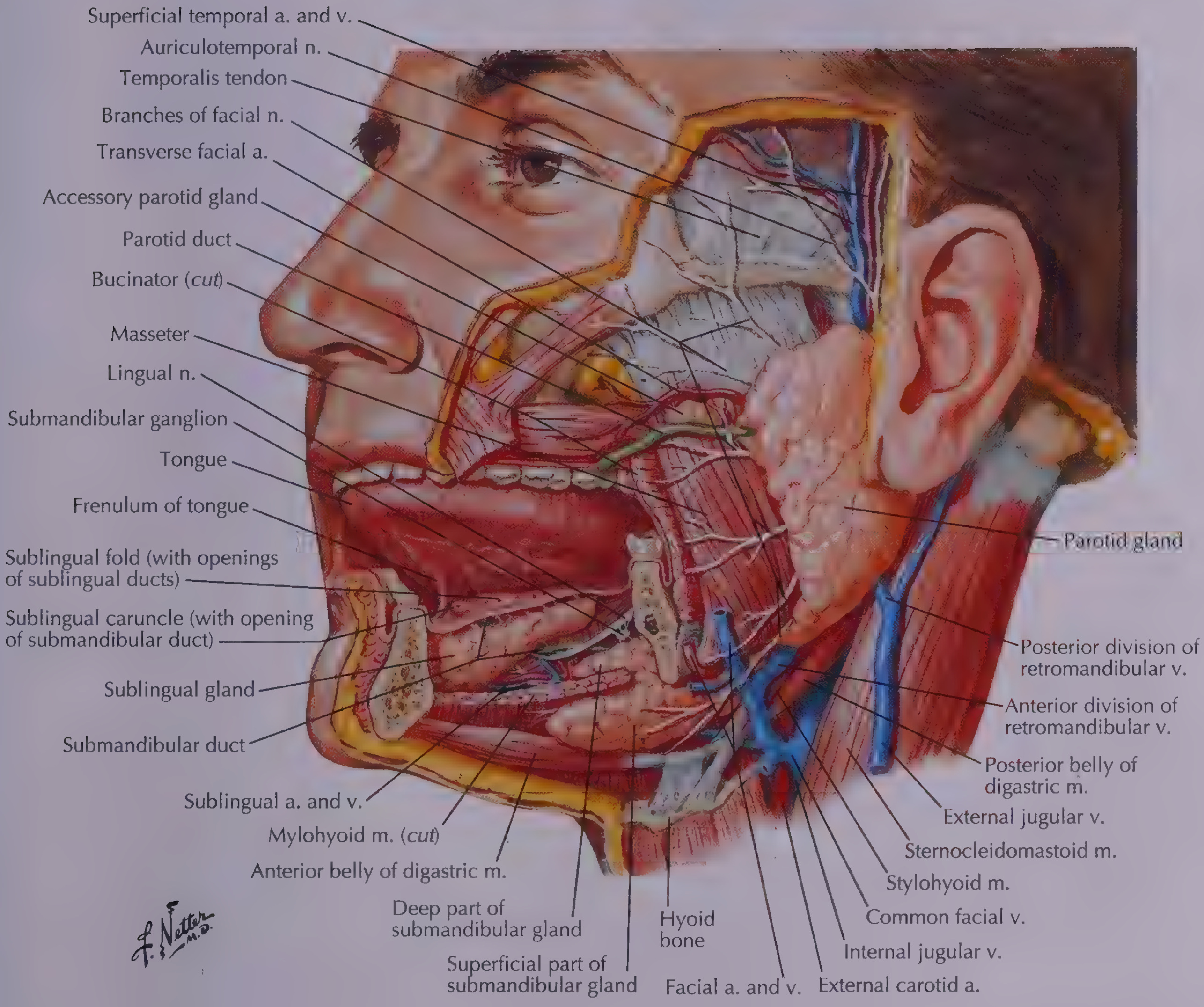

Falx cerebri
Brain
Nasal septum
Middle nasal concha
Middle nasal meatus
Infraorbital n., a., and v.
Maxillary sinus
Inferior nasal concha
Inferior nasal meatus
Palatine process of maxilla
Oral cavity
Genioglossus m.
Mylohyoid m.
Geniohyoid m.
Olfactory bulbs
Frontal sinus
Ethmoidal cells
Lacrimal gland
Opening of maxillary sinus
Infraorbital recess
Zygomatic recess
Alveolar recess
Maxillary sinus
Alveolar process of maxilla
Bucinator
Tongue
Sublingual gland
Mandible
Anterior belly of digastric m.

Transverse section

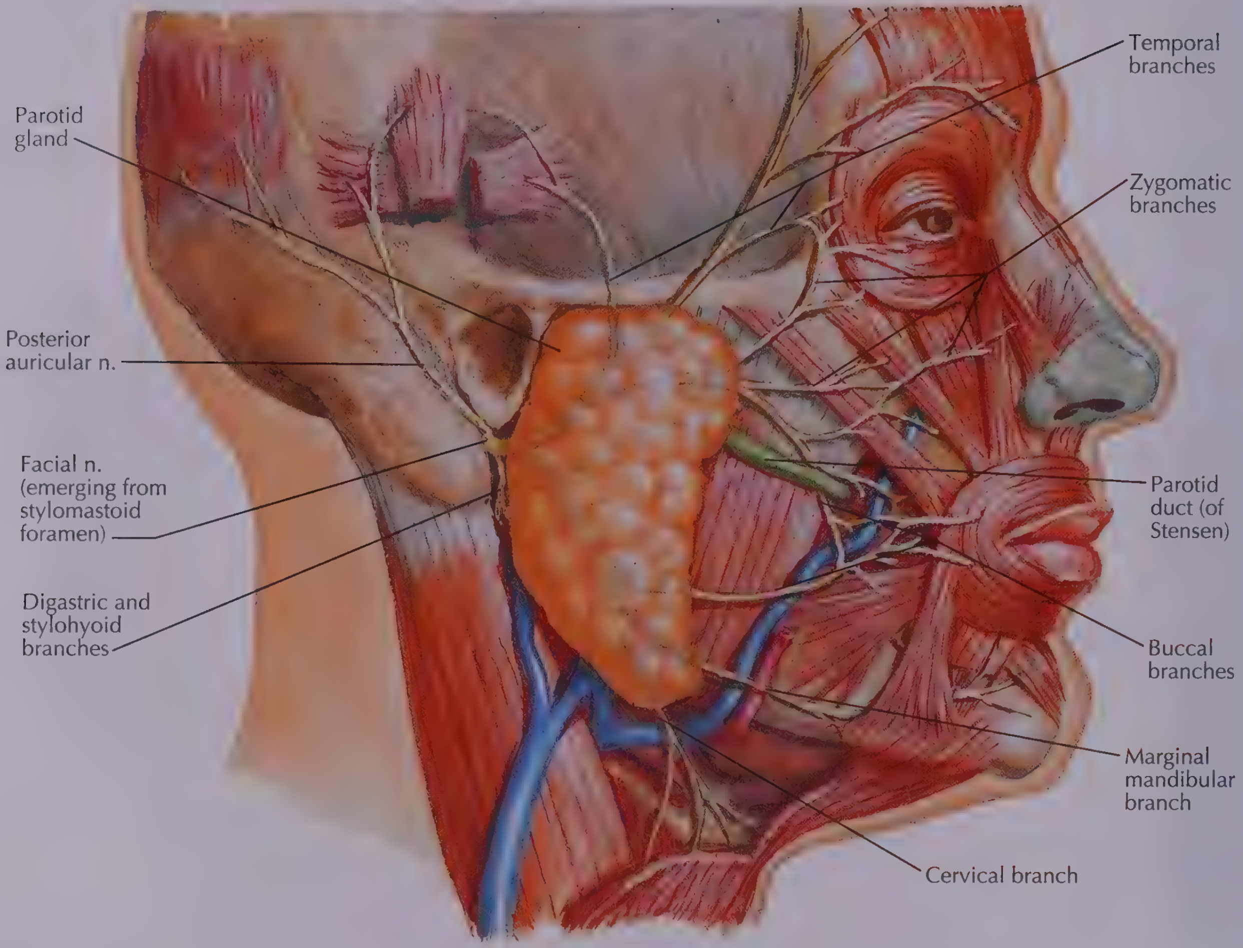

Nasal bone
Lacrimal bone
Ethmoidal cells
Eyeball
Zygomatic bone
Orbital fat body
Sphenoidal sinuses
Optic chiasm
Temporal lobe
Infundibular recess of third ventricle
Mammillary bodies
Crus cerebri
Aqueduct of midbrain
Vermis
Nasal septum
Medial wall of orbit
Medial rectus m.
Lateral rectus m.
Optic n. (CN II)
Temporalis m.
Optic tract
Interpeduncular fossa

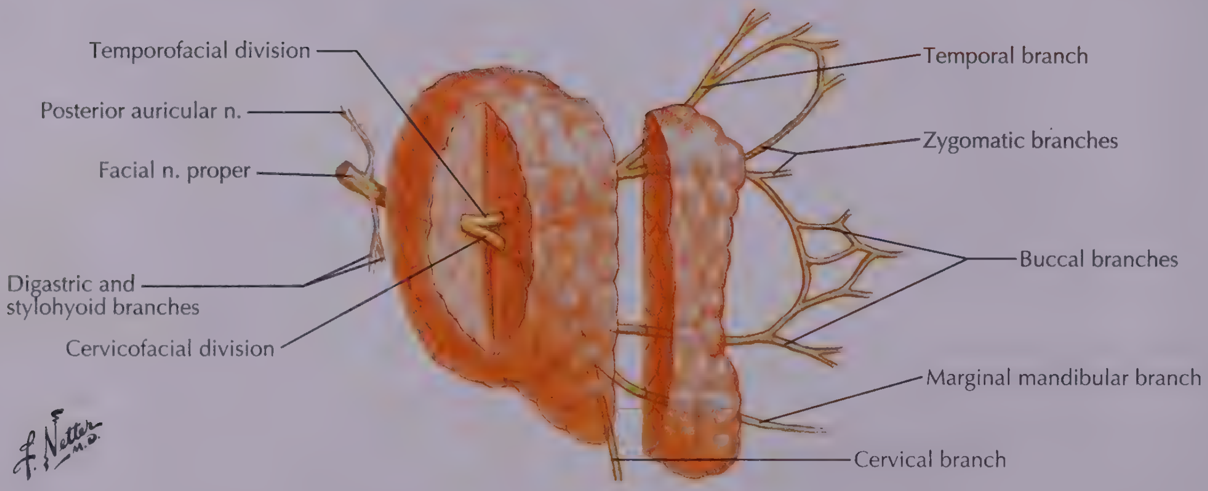
C.Machado M.D.

See also Plates 71, 160, 161


Superficial temporal a. and v.
Auriculotemporal n.
Temporalis tendon
Branches of facial n.
Transverse facial a.
Accessory parotid gland
Parotid duct
Bucinator (*cut*)
Masseter
Lingual n.
Submandibular ganglion
Tongue
Frenulum of tongue
Sublingual fold (with openings of sublingual ducts)
Sublingual caruncle (with opening of submandibular duct)
Sublingual gland
Submandibular duct
Sublingual a. and v.
Mylohyoid m. (*cut*)
Anterior belly of digastric m.
Deep part of submandibular gland
Superficial part of submandibular gland
Hyoid bone
Facial a. and v.
External carotid a.
Internal jugular v.
Common facial v.
Stylohyoid m.
Sternocleidomastoid m.
External jugular v.
Posterior belly of digastric m.
Anterior division of retromandibular v.
Posterior division of retromandibular v.
Parotid gland
F. Netter M.D.

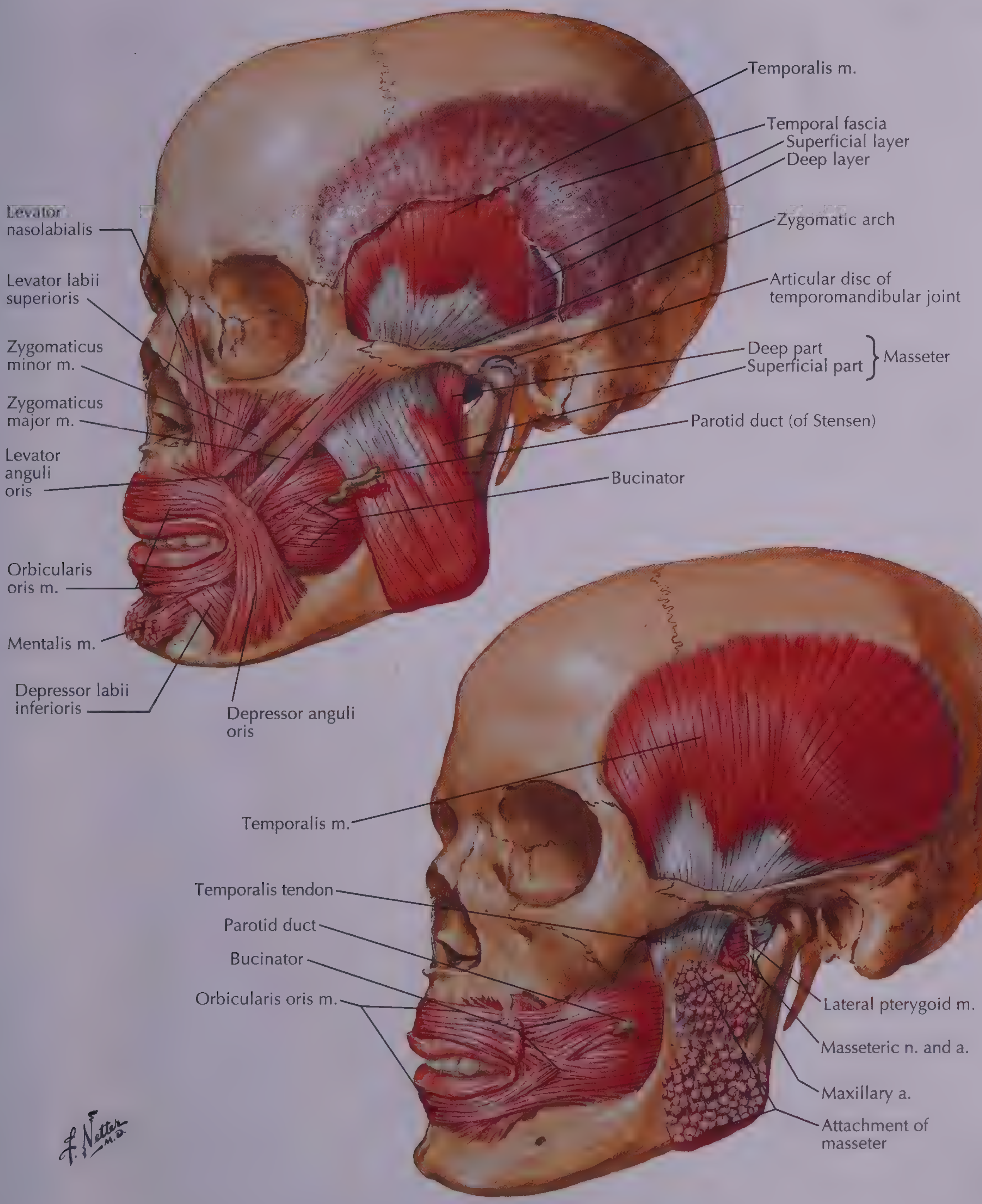
See also Plates 70, 150


Parotid gland
Posterior auricular n.
Facial n. (emerging from stylomastoid foramen)
Digastric and stylohyoid branches
Temporal branches
Zygomatic branches
Parotid duct (of Stensen)
Buccal branches
Marginal mandibular branch
Cervical branch


Temporofacial division
Posterior auricular n.
Facial n. proper
Digastric and stylohyoid branches
Cervicofacial division
Temporal branch
Zygomatic branches
Buccal branches
Marginal mandibular branch
Cervical branch

Muscles of Mastication: Masseter and Temporalis Muscle

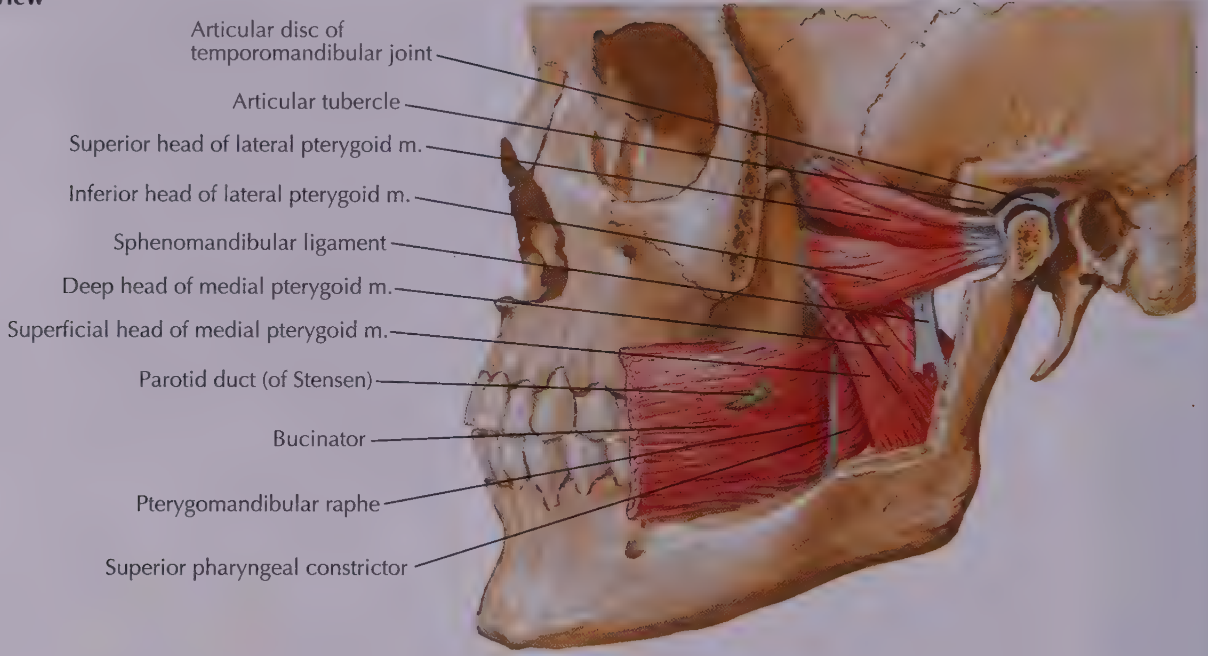
For facial muscles see **Plates 48, BP 25**


Temporalis m.
Temporal fascia
Superficial layer
Deep layer
Levator nasolabialis
Zygomatic arch
Levator labii superioris
Articular disc of temporomandibular joint
Zygomaticus minor m.
Deep part
Superficial part
Masseter
Zygomaticus major m.
Parotid duct (of Stensen)
Levator anguli oris
Bucinator
Orbicularis oris m.
Mentalis m.
Depressor labii inferioris
Depressor anguli oris
Temporalis m.
Temporalis tendon
Parotid duct
Bucinator
Orbicularis oris m.
Lateral pterygoid m.
Masseteric n. and a.
Maxillary a.
Attachment of masseter
F. Netter M.D.

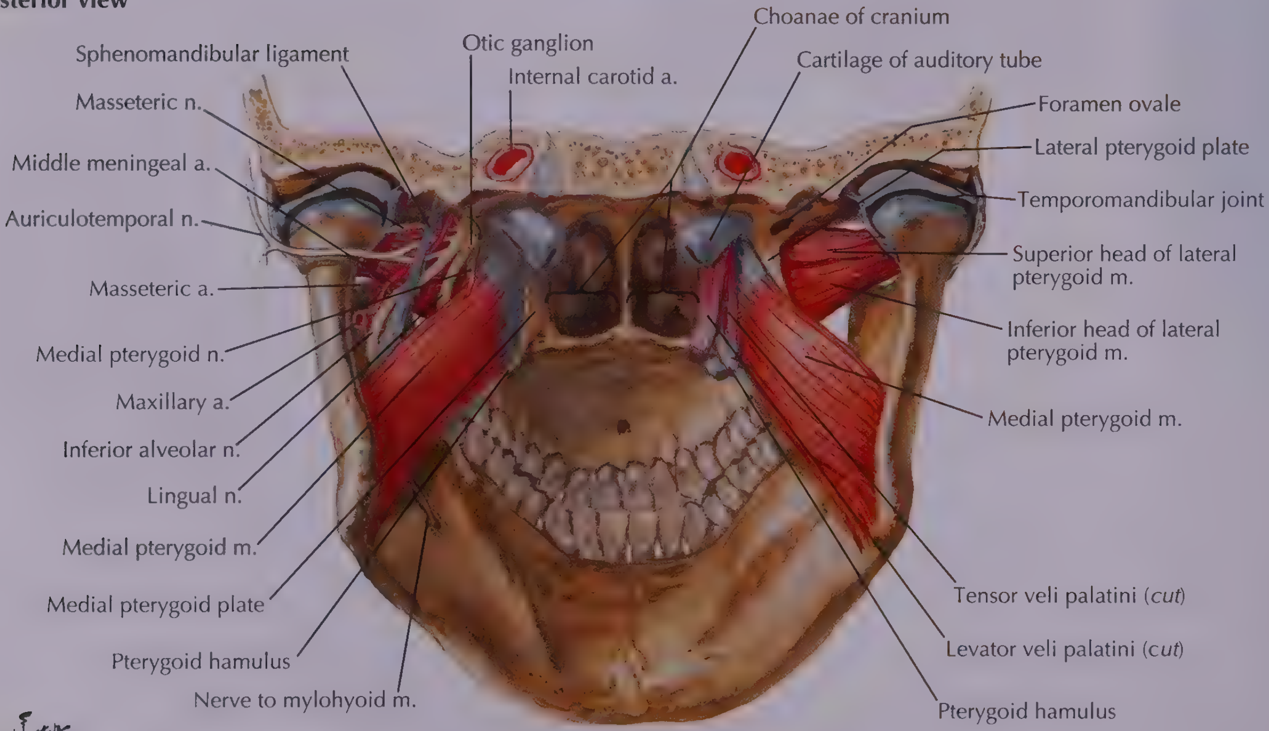
Muscles of Mastication: Pterygoid Muscles

See also Plates 72, 77, BP 25

Lateral view

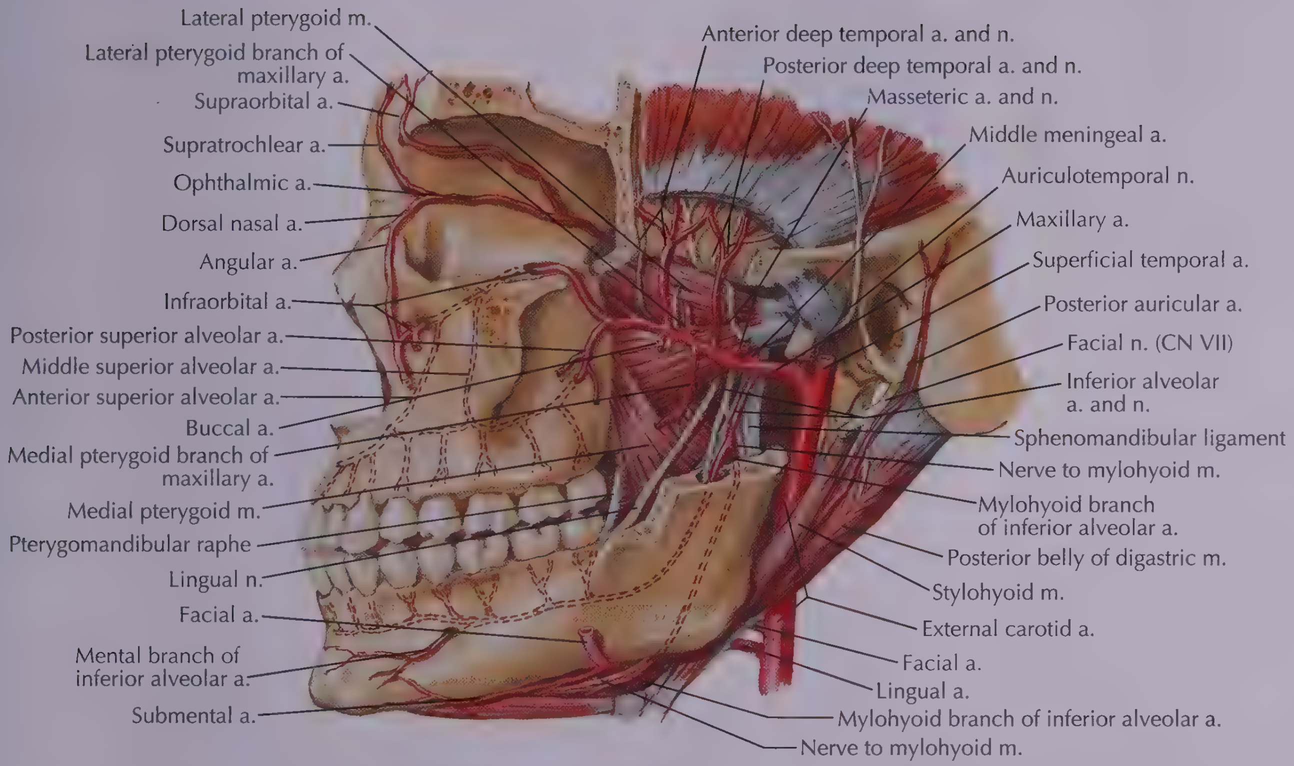

Articular disc of temporomandibular joint
Articular tubercle
Superior head of lateral pterygoid m.
Inferior head of lateral pterygoid m.
Sphenomandibular ligament
Deep head of medial pterygoid m.
Superficial head of medial pterygoid m.
Parotid duct (of Stensen)
Bucinator
Pterygomandibular raphe
Superior pharyngeal constrictor

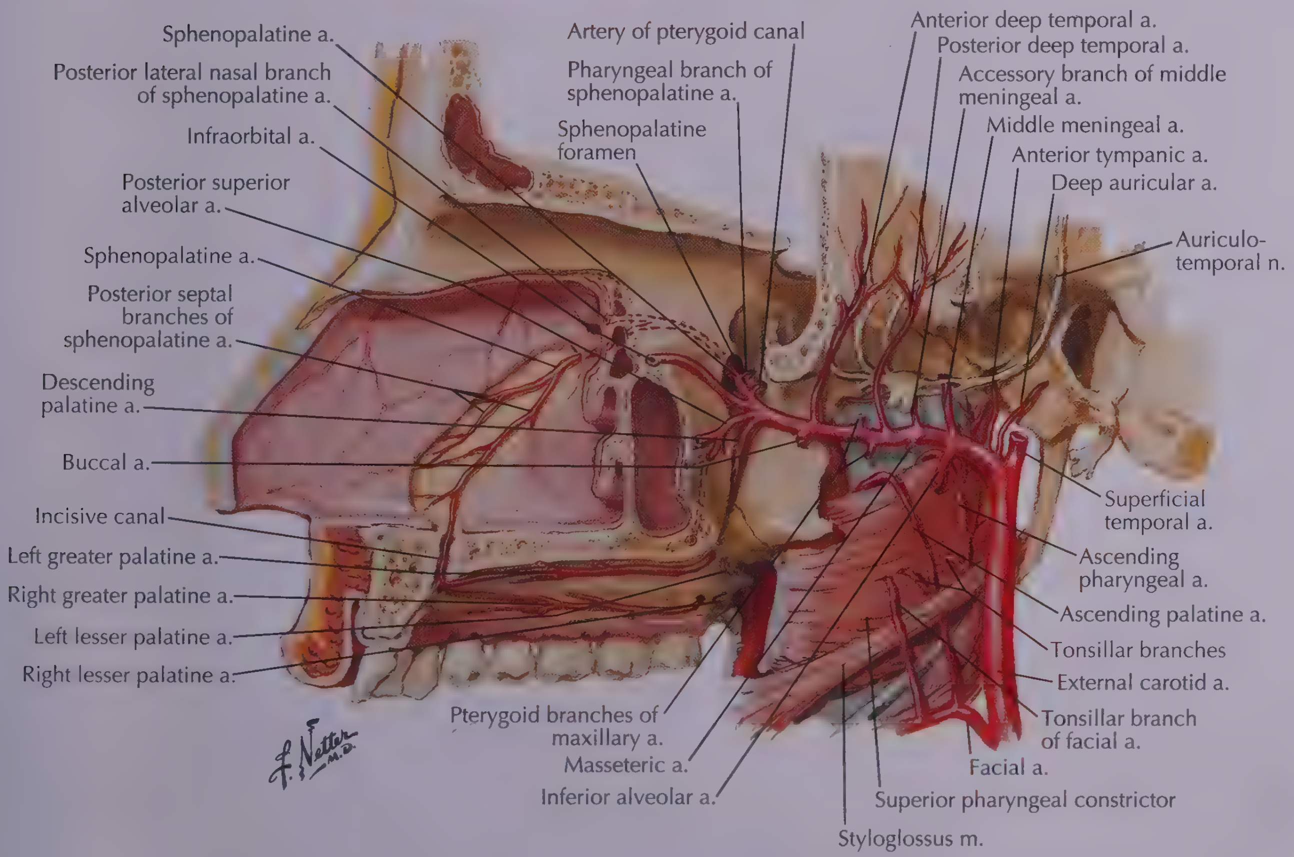
Posterior view


Sphenomandibular ligament
Masseteric n.
Middle meningeal a.
Auriculotemporal n.
Masseteric a.
Medial pterygoid n.
Maxillary a.
Inferior alveolar n.
Lingual n.
Medial pterygoid m.
Medial pterygoid plate
Pterygoid hamulus
Nerve to mylohyoid m.
Otic ganglion
Internal carotid a.
Choanae of cranium
Cartilage of auditory tube
Foramen ovale
Lateral pterygoid plate
Temporomandibular joint
Superior head of lateral pterygoid m.
Inferior head of lateral pterygoid m.
Medial pterygoid m.
Tensor veli palatini (*cut*)
Levator veli palatini (*cut*)
Pterygoid hamulus

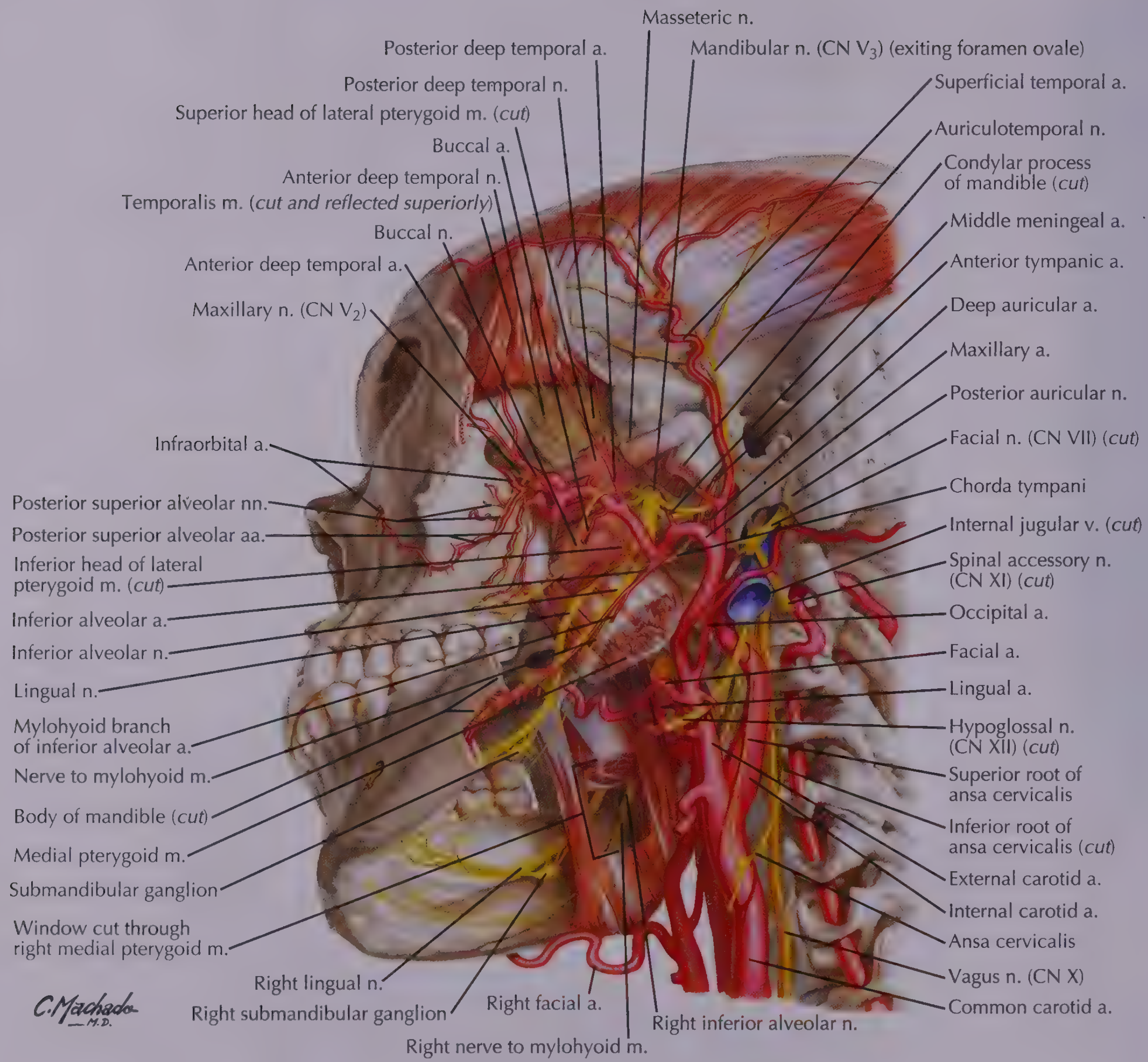
Maxillary Artery

See also Plates 81, 99


Lateral pterygoid m.
Lateral pterygoid branch of maxillary a.
Supraorbital a.
Supratrochlear a.
Ophthalmic a.
Dorsal nasal a.
Angular a.
Infraorbital a.
Posterior superior alveolar a.
Middle superior alveolar a.
Anterior superior alveolar a.
Buccal a.
Medial pterygoid branch of maxillary a.
Medial pterygoid m.
Pterygomandibular raphe
Lingual n.
Facial a.
Mental branch of inferior alveolar a.
Submental a.
Anterior deep temporal a. and n.
Posterior deep temporal a. and n.
Masseteric a. and n.
Middle meningeal a.
Auriculotemporal n.
Maxillary a.
Superficial temporal a.
Posterior auricular a.
Facial n. (CN VII)
Inferior alveolar a. and n.
Sphenomandibular ligament
Nerve to mylohyoid m.
Mylohyoid branch of inferior alveolar a.
Posterior belly of digastric m.
Stylohyoid m.
External carotid a.
Facial a.
Lingual a.
Mylohyoid branch of inferior alveolar a.
Nerve to mylohyoid m.


Sphenopalatine a.
Posterior lateral nasal branch of sphenopalatine a.
Infraorbital a.
Posterior superior alveolar a.
Sphenopalatine a.
Posterior septal branches of sphenopalatine a.
Descending palatine a.
Buccal a.
Incisive canal
Left greater palatine a.
Right greater palatine a.
Left lesser palatine a.
Right lesser palatine a.
Artery of pterygoid canal
Pharyngeal branch of sphenopalatine a.
Sphenopalatine foramen
Pterygoid branches of maxillary a.
Masseteric a.
Inferior alveolar a.
Anterior deep temporal a.
Posterior deep temporal a.
Accessory branch of middle meningeal a.
Middle meningeal a.
Anterior tympanic a.
Deep auricular a.
Auriculo-temporal n.
Superficial temporal a.
Ascending pharyngeal a.
Ascending palatine a.
Tonsillar branches
External carotid a.
Tonsillar branch of facial a.
Facial a.
Superior pharyngeal constrictor
Styloglossus m.
F. Netter M.D.

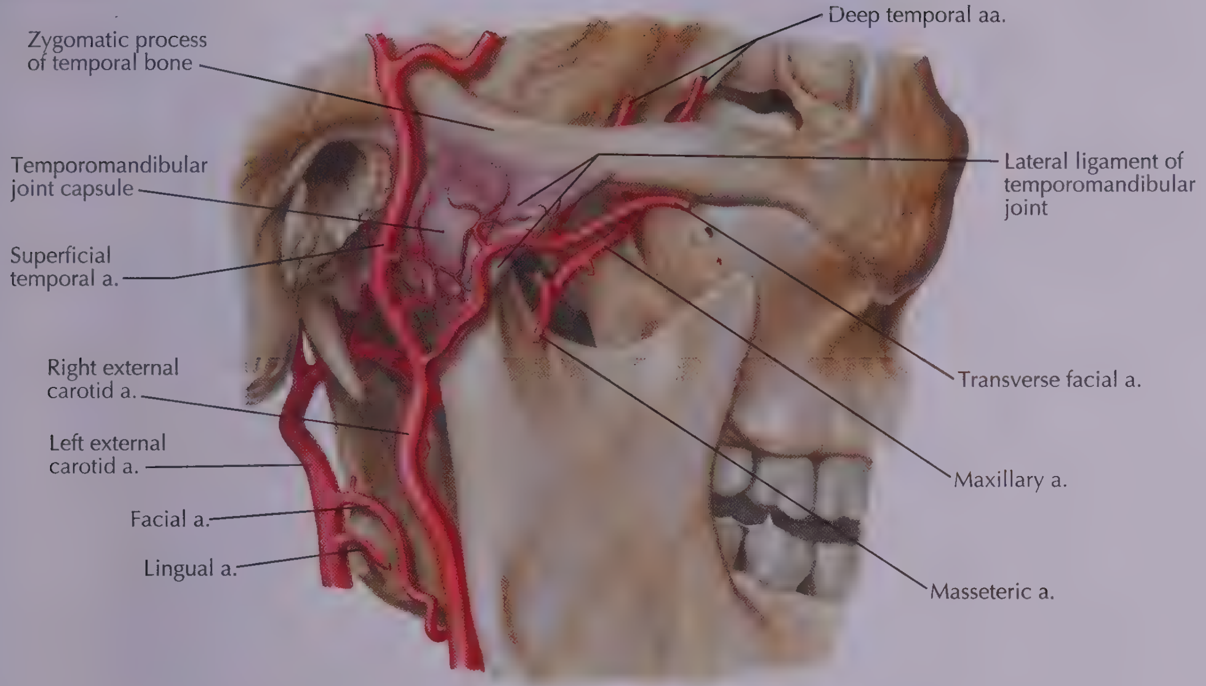
See also Plates 74, 76, 77


Masseteric n.
Posterior deep temporal a.
Mandibular n. (CN V_3) (exiting foramen ovale)
Posterior deep temporal n.
Superior head of lateral pterygoid m. (*cut*)
Buccal a.
Anterior deep temporal n.
Temporalis m. (*cut and reflected superiorly*)
Buccal n.
Anterior deep temporal a.
Maxillary n. (CN V_2)
Infraorbital a.
Posterior superior alveolar nn.
Posterior superior alveolar aa.
Inferior head of lateral pterygoid m. (*cut*)
Inferior alveolar a.
Inferior alveolar n.
Lingual n.
Mylohyoid branch of inferior alveolar a.
Nerve to mylohyoid m.
Body of mandible (*cut*)
Medial pterygoid m.
Submandibular ganglion
Window cut through right medial pterygoid m.
C.Machado M.D.
Right lingual n.
Right submandibular ganglion
Right facial a.
Right nerve to mylohyoid m.
Right inferior alveolar n.
Superficial temporal a.
Auriculotemporal n.
Condylar process of mandible (*cut*)
Middle meningeal a.
Anterior tympanic a.
Deep auricular a.
Maxillary a.
Posterior auricular n.
Facial n. (CN VII) (*cut*)
Chorda tympani
Internal jugular v. (*cut*)
Spinal accessory n. (CN XI) (*cut*)
Occipital a.
Facial a.
Lingual a.
Hypoglossal n. (CN XII) (*cut*)
Superior root of ansa cervicalis
Inferior root of ansa cervicalis (*cut*)
External carotid a.
Internal carotid a.
Ansa cervicalis
Vagus n. (CN X)
Common carotid a.

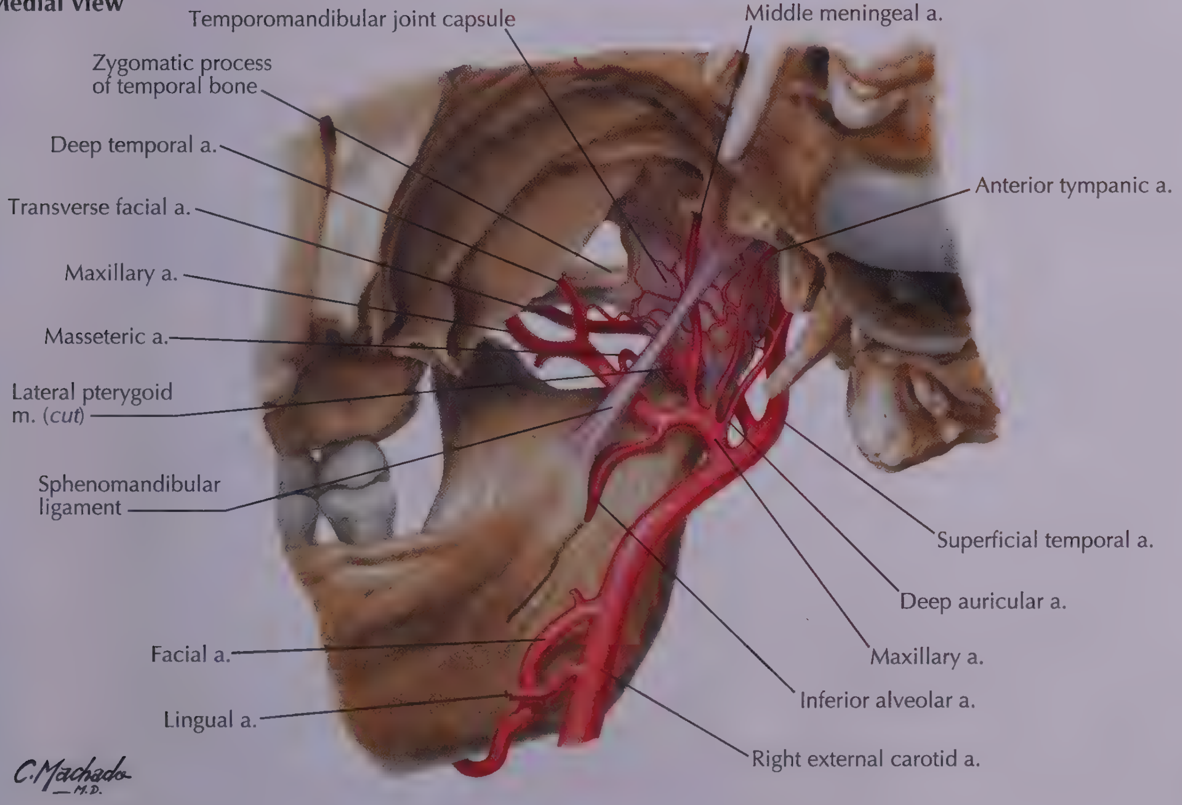
Superficial Temporal and Maxillary Arteries

See also Plates 74, 77, 81

Lateral view

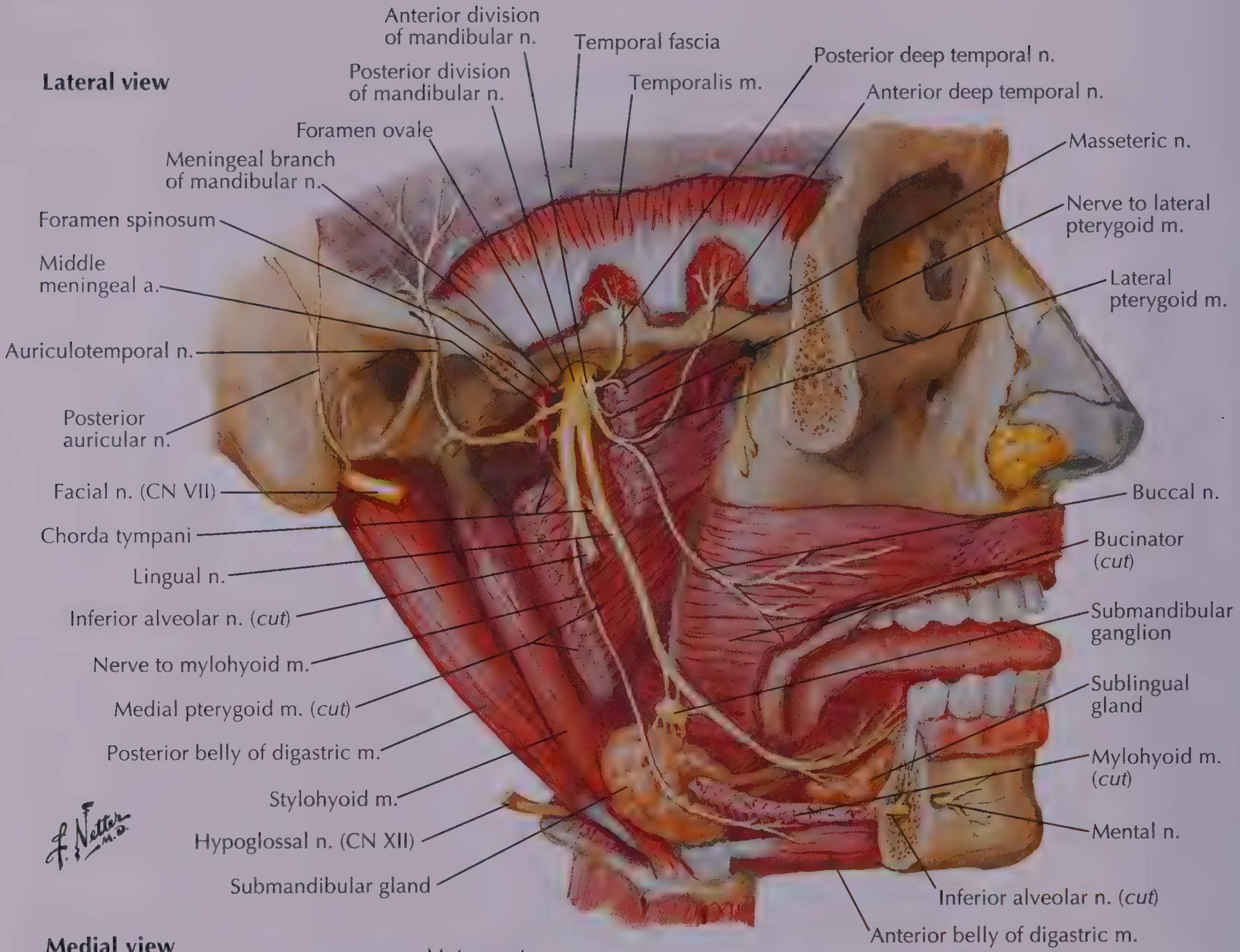

Zygomatic process of temporal bone
Temporomandibular joint capsule
Superficial temporal a.
Right external carotid a.
Left external carotid a.
Facial a.
Lingual a.
Deep temporal aa.
Lateral ligament of temporomandibular joint
Transverse facial a.
Maxillary a.
Masseteric a.

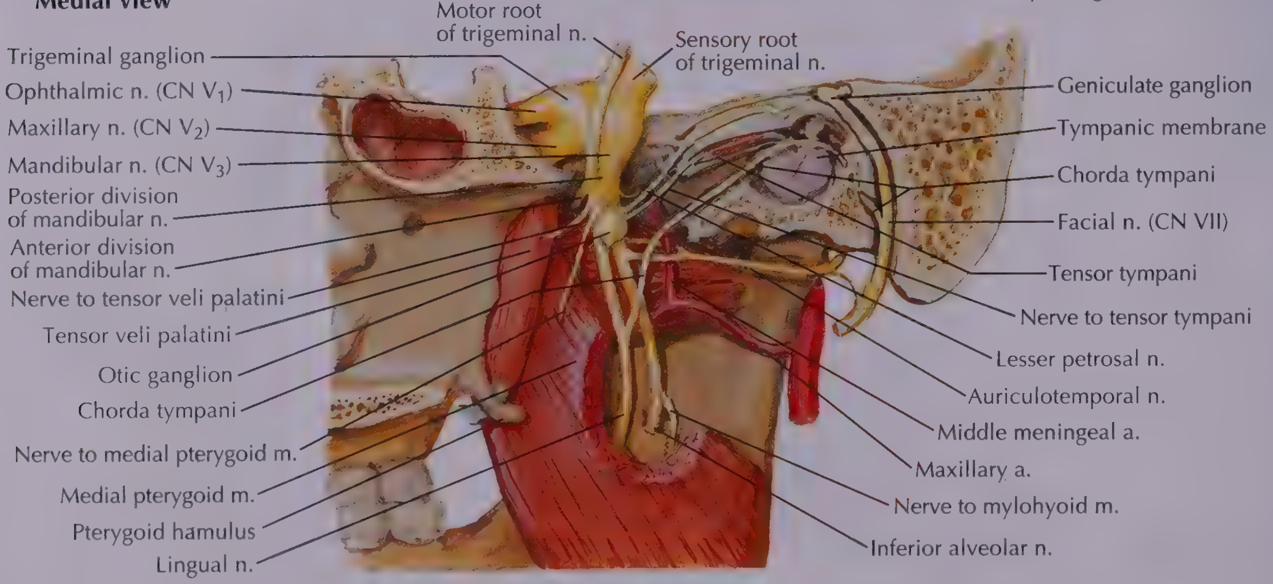
Medial view


Temporomandibular joint capsule
Middle meningeal a.
Zygomatic process of temporal bone
Deep temporal a.
Transverse facial a.
Maxillary a.
Masseteric a.
Lateral pterygoid m. (cut)
Sphenomandibular ligament
Anterior tympanic a.
Superficial temporal a.
Deep auricular a.
Facial a.
Maxillary a.
Inferior alveolar a.
Lingual a.
Right external carotid a.
C.Machado M.D.

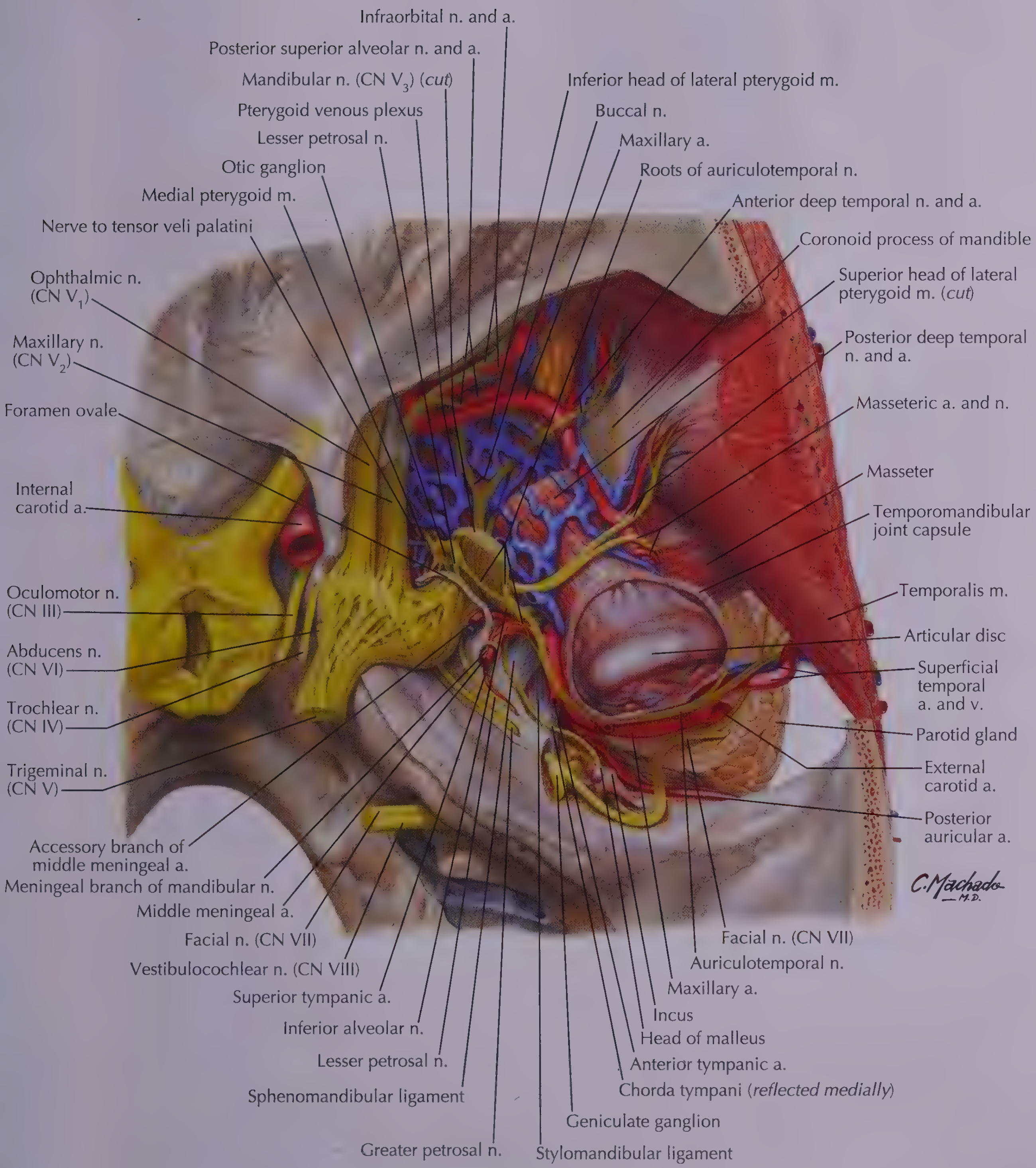
Mandibular Nerve (CN V_3)

See also Plates 98, 149


Lateral view
Anterior division of mandibular n.
Temporal fascia
Posterior deep temporal n.
Posterior division of mandibular n.
Temporalis m.
Anterior deep temporal n.
Foramen ovale
Meningeal branch of mandibular n.
Masseteric n.
Foramen spinosum
Nerve to lateral pterygoid m.
Middle meningeal a.
Lateral pterygoid m.
Auriculotemporal n.
Posterior auricular n.
Facial n. (CN VII)
Buccal n.
Chorda tympani
Bucinator (*cut*)
Lingual n.
Inferior alveolar n. (*cut*)
Submandibular ganglion
Nerve to mylohyoid m.
Sublingual gland
Medial pterygoid m. (*cut*)
Posterior belly of digastric m.
Mylohyoid m. (*cut*)
Stylohyoid m.
Mental n.
Hypoglossal n. (CN XII)
Submandibular gland
Inferior alveolar n. (*cut*)
Anterior belly of digastric m.

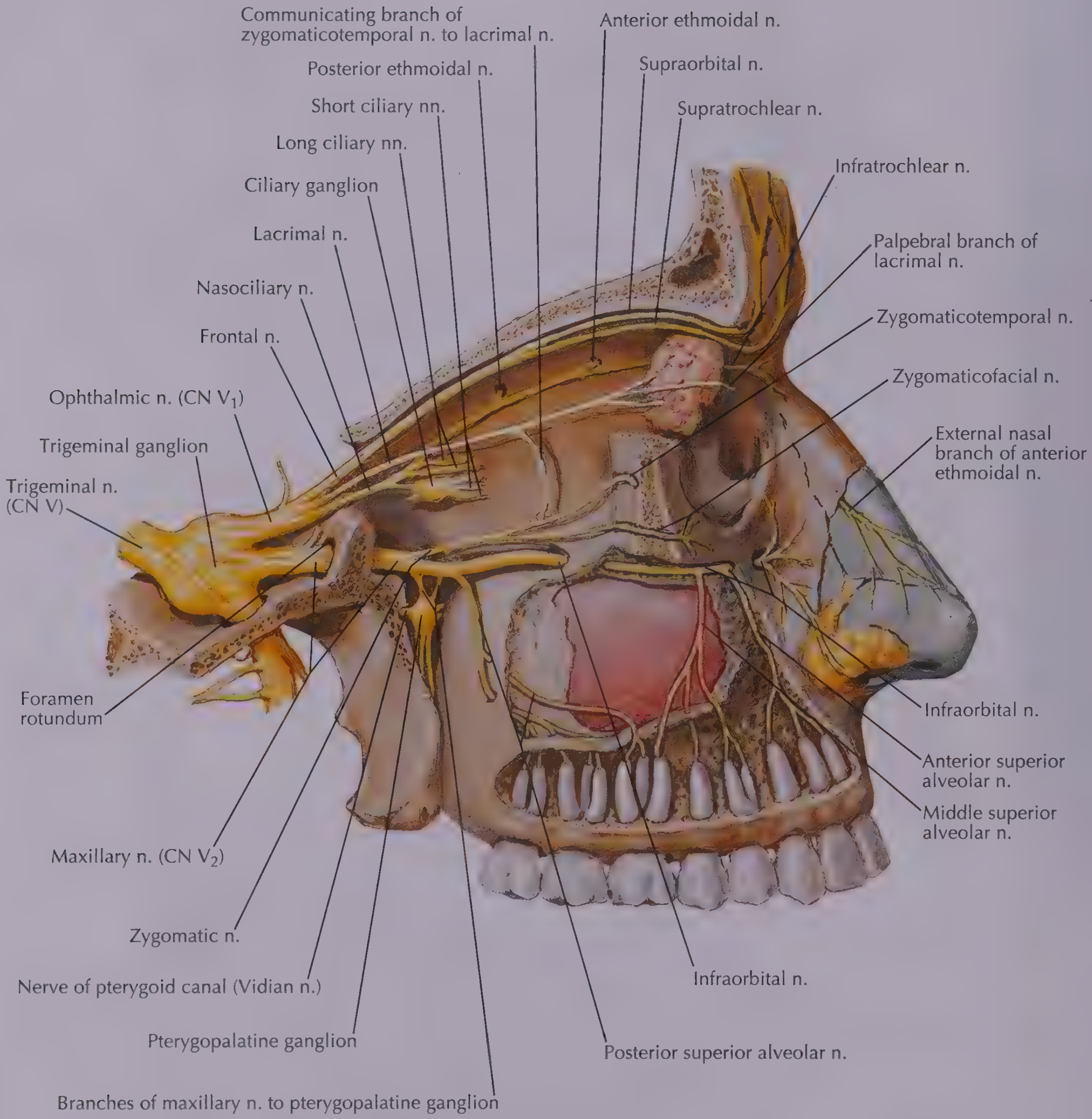

Medial view
Motor root of trigeminal n.
Sensory root of trigeminal n.
Trigeminal ganglion
Ophthalmic n. (CN V_1)
Geniculate ganglion
Maxillary n. (CN V_2)
Tympanic membrane
Mandibular n. (CN V_3)
Chorda tympani
Posterior division of mandibular n.
Facial n. (CN VII)
Anterior division of mandibular n.
Tensor tympani
Nerve to tensor veli palatini
Nerve to tensor tympani
Tensor veli palatini
Lesser petrosal n.
Otic ganglion
Auriculotemporal n.
Chorda tympani
Middle meningeal a.
Nerve to medial pterygoid m.
Maxillary a.
Medial pterygoid m.
Nerve to mylohyoid m.
Pterygoid hamulus
Inferior alveolar n.
Lingual n.

See also Plates 74, 76, 77, 81, 82, 131


Infraorbital n. and a.
Posterior superior alveolar n. and a.
Mandibular n. (CN V_3) (*cut*)
Pterygoid venous plexus
Lesser petrosal n.
Otic ganglion
Medial pterygoid m.
Nerve to tensor veli palatini
Ophthalmic n. (CN V_1)
Maxillary n. (CN V_2)
Foramen ovale
Internal carotid a.
Oculomotor n. (CN III)
Abducens n. (CN VI)
Trochlear n. (CN IV)
Trigeminal n. (CN V)
Accessory branch of middle meningeal a.
Meningeal branch of mandibular n.
Middle meningeal a.
Facial n. (CN VII)
Vestibulocochlear n. (CN VIII)
Superior tympanic a.
Inferior alveolar n.
Lesser petrosal n.
Sphenomandibular ligament
Greater petrosal n.
Inferior head of lateral pterygoid m.
Buccal n.
Maxillary a.
Roots of auriculotemporal n.
Anterior deep temporal n. and a.
Coronoid process of mandible
Superior head of lateral pterygoid m. (*cut*)
Posterior deep temporal n. and a.
Masseteric a. and n.
Masseter
Temporomandibular joint capsule
Temporalis m.
Articular disc
Superficial temporal a. and v.
Parotid gland
External carotid a.
Posterior auricular a.
C. Machado M.D.
Facial n. (CN VII)
Auriculotemporal n.
Maxillary a.
Incus
Head of malleus
Anterior tympanic a.
Chorda tympani (*reflected medially*)
Geniculate ganglion
Stylomandibular ligament

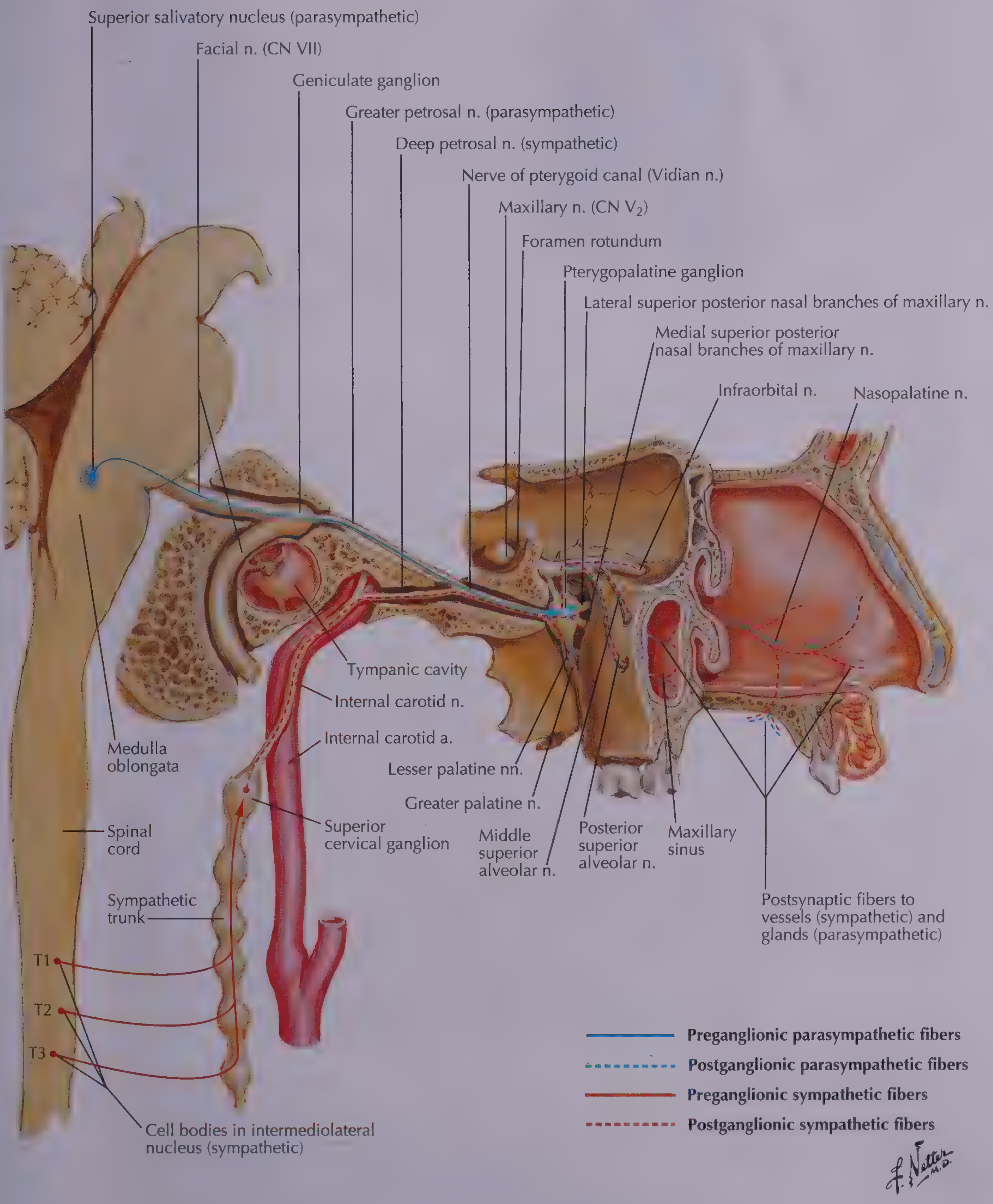
Ophthalmic and Maxillary Nerves

See also Plates 81, 84


Communicating branch of zygomaticotemporal n. to lacrimal n.
Anterior ethmoidal n.
Posterior ethmoidal n.
Supraorbital n.
Short ciliary nn.
Supratrochlear n.
Long ciliary nn.
Infratrochlear n.
Ciliary ganglion
Lacrimal n.
Palpebral branch of lacrimal n.
Nasociliary n.
Zygomaticotemporal n.
Frontal n.
Zygomaticofacial n.
Ophthalmic n. (CN V1)
Trigeminal ganglion
External nasal branch of anterior ethmoidal n.
Trigeminal n. (CN V)
Foramen rotundum
Infraorbital n.
Anterior superior alveolar n.
Middle superior alveolar n.
Maxillary n. (CN V2)
Zygomatic n.
Nerve of pterygoid canal (Vidian n.)
Infraorbital n.
Pterygopalatine ganglion
Posterior superior alveolar n.
Branches of maxillary n. to pterygopalatine ganglion

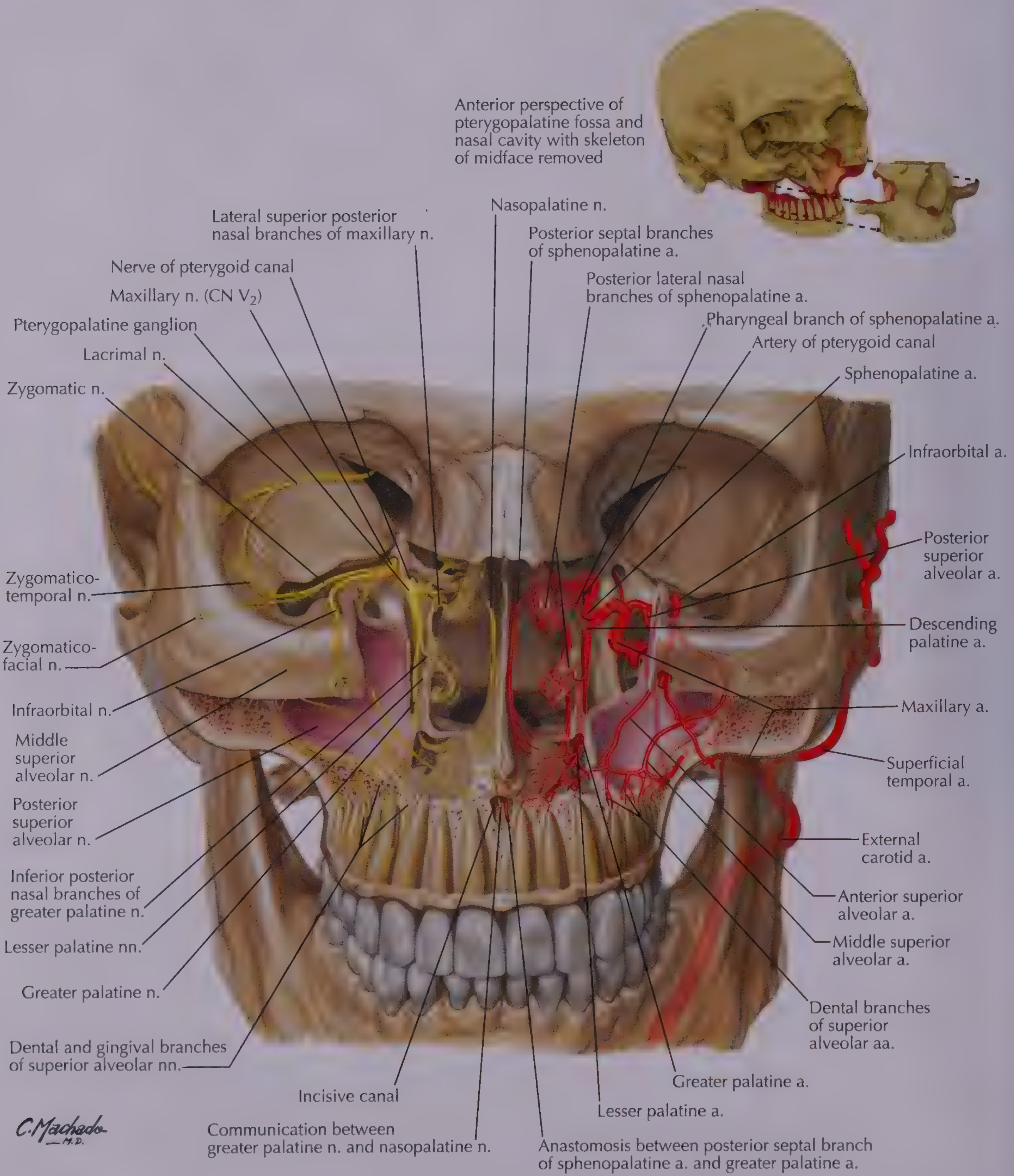
Autonomic Innervation of Nasal Cavity

See also Plates 149, 158, 160


Superior salivatory nucleus (parasympathetic)
Facial n. (CN VII)
Geniculate ganglion
Greater petrosal n. (parasympathetic)
Deep petrosal n. (sympathetic)
Nerve of pterygoid canal (Vidian n.)
Maxillary n. (CN V_2)
Foramen rotundum
Pterygopalatine ganglion
Lateral superior posterior nasal branches of maxillary n.
Medial superior posterior nasal branches of maxillary n.
Infraorbital n.
Nasopalatine n.
Tympanic cavity
Internal carotid n.
Internal carotid a.
Medulla oblongata
Lesser palatine nn.
Greater palatine n.
Spinal cord
Superior cervical ganglion
Middle superior alveolar n.
Posterior superior alveolar n.
Maxillary sinus
Postsynaptic fibers to vessels (sympathetic) and glands (parasympathetic)
Sympathetic trunk
T1
T2
T3
Cell bodies in intermediolateral nucleus (sympathetic)
Preganglionic parasympathetic fibers
Postganglionic parasympathetic fibers
Preganglionic sympathetic fibers
Postganglionic sympathetic fibers

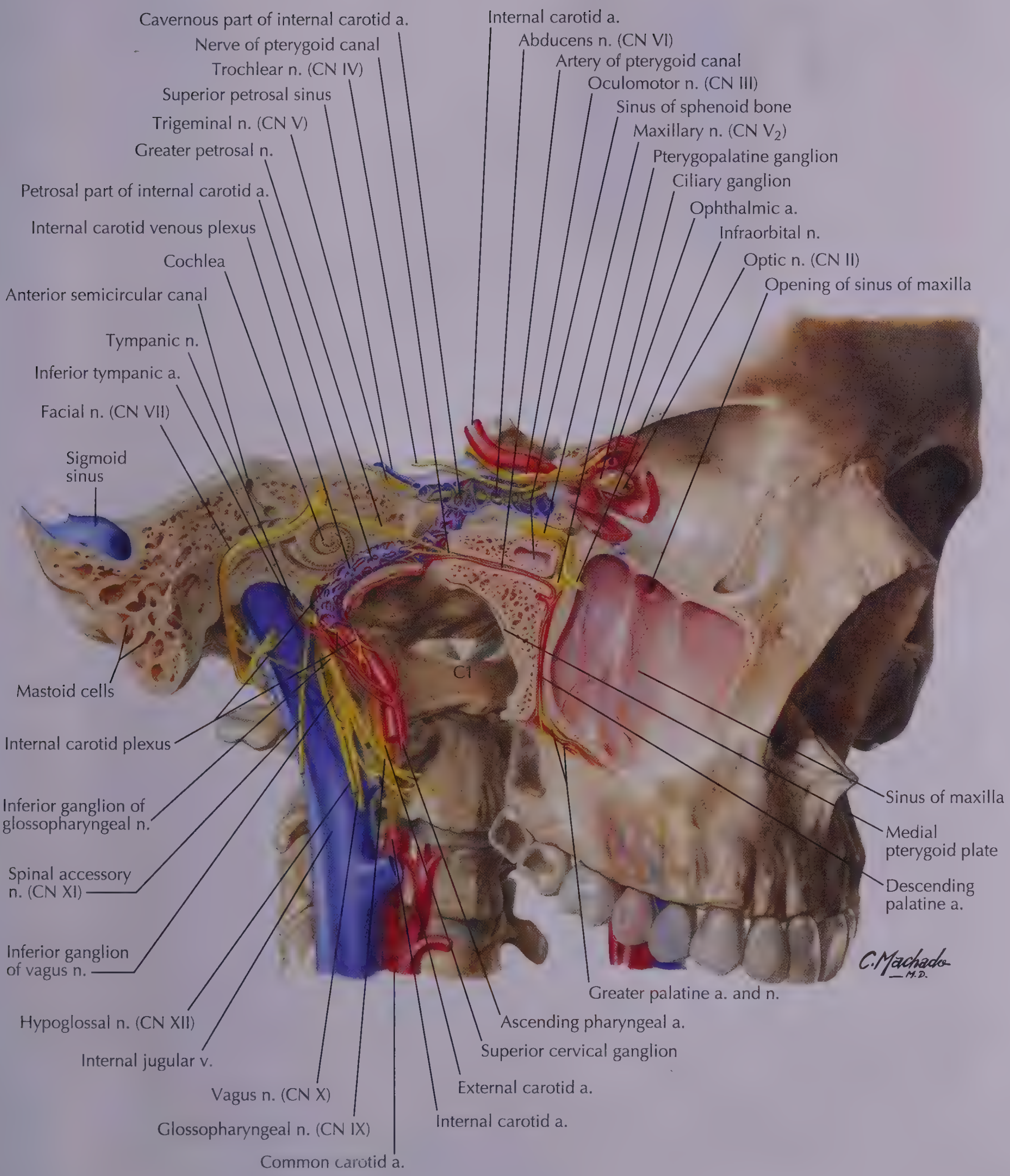
Nerves and Arteries of Midface

See also Plates 64, 66, 79

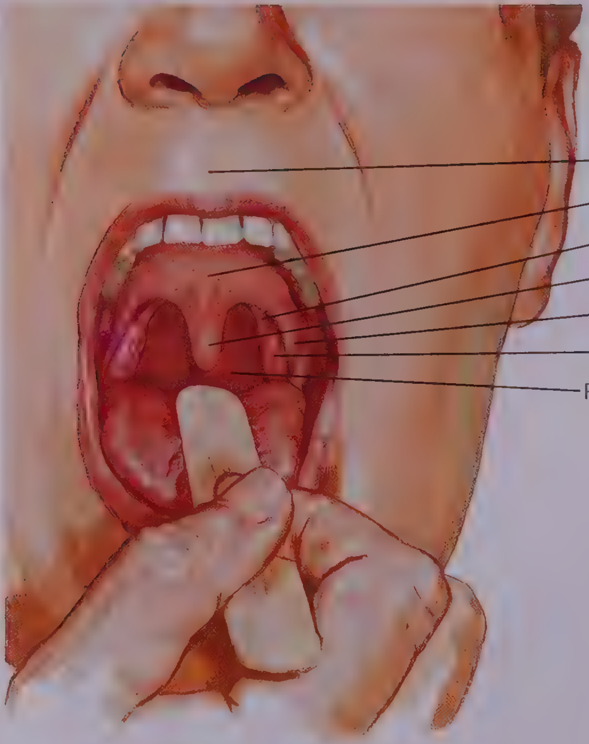

Anterior perspective of pterygopalatine fossa and nasal cavity with skeleton of midface removed
Lateral superior posterior nasal branches of maxillary n.
Nerve of pterygoid canal
Maxillary n. (CN V_2)
Pterygopalatine ganglion
Lacrimal n.
Zygomatic n.
Zygomatico-temporal n.
Zygomatico-facial n.
Infraorbital n.
Middle superior alveolar n.
Posterior superior alveolar n.
Inferior posterior nasal branches of greater palatine n.
Lesser palatine nn.
Greater palatine n.
Dental and gingival branches of superior alveolar nn.
Incisive canal
Communication between greater palatine n. and nasopalatine n.
Nasopalatine n.
Posterior septal branches of sphenopalatine a.
Posterior lateral nasal branches of sphenopalatine a.
Pharyngeal branch of sphenopalatine a.
Artery of pterygoid canal
Sphenopalatine a.
Infraorbital a.
Posterior superior alveolar a.
Descending palatine a.
Maxillary a.
Superficial temporal a.
External carotid a.
Anterior superior alveolar a.
Middle superior alveolar a.
Dental branches of superior alveolar aa.
Greater palatine a.
Lesser palatine a.
Anastomosis between posterior septal branch of sphenopalatine a. and greater palatine a.
C.Machado M.D.

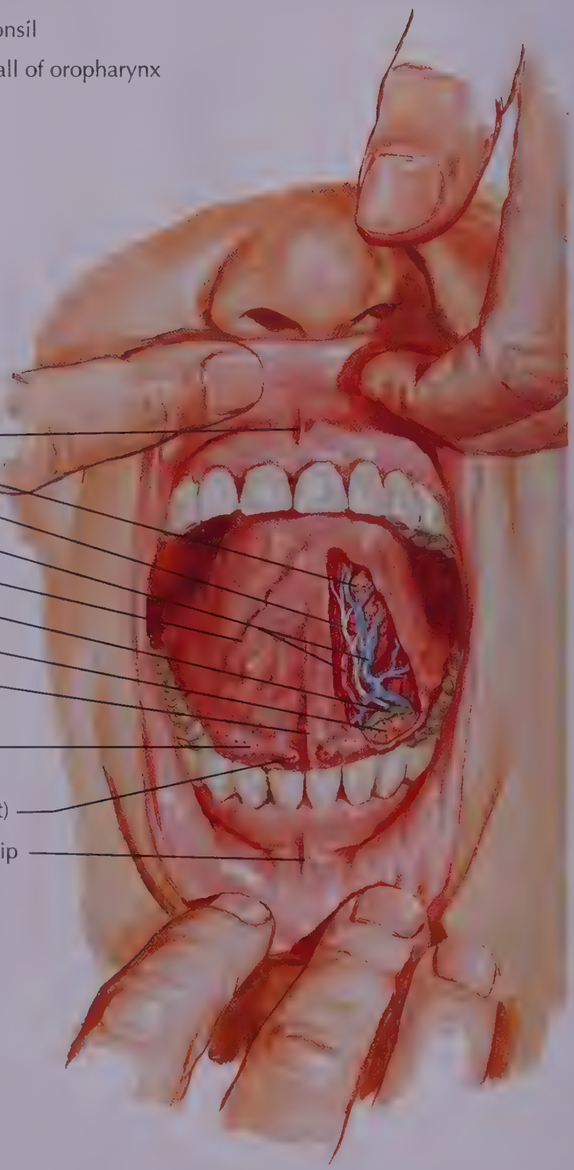
Orientation of Nerves and Vessels of Cranial Base

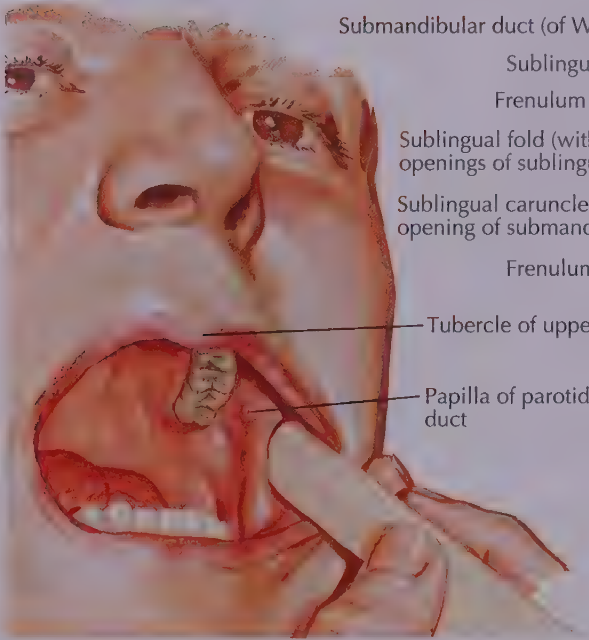
See also Plates 91, 131, 158, 163


Cavernous part of internal carotid a.
Nerve of pterygoid canal
Trochlear n. (CN IV)
Superior petrosal sinus
Trigeminal n. (CN V)
Greater petrosal n.
Petrosal part of internal carotid a.
Internal carotid venous plexus
Cochlea
Anterior semicircular canal
Tympanic n.
Inferior tympanic a.
Facial n. (CN VII)
Sigmoid sinus
Mastoid cells
Internal carotid plexus
Inferior ganglion of glossopharyngeal n.
Spinal accessory n. (CN XI)
Inferior ganglion of vagus n.
Hypoglossal n. (CN XII)
Internal jugular v.
Vagus n. (CN X)
Glossopharyngeal n. (CN IX)
Common carotid a.
Internal carotid a.
Abducens n. (CN VI)
Artery of pterygoid canal
Oculomotor n. (CN III)
Sinus of sphenoid bone
Maxillary n. (CN V$_2$)
Pterygopalatine ganglion
Ciliary ganglion
Ophthalmic a.
Infraorbital n.
Optic n. (CN II)
Opening of sinus of maxilla
C1
Sinus of maxilla
Medial pterygoid plate
Descending palatine a.
C. Machado M.D.
Greater palatine a. and n.
Ascending pharyngeal a.
Superior cervical ganglion
External carotid a.
Internal carotid a.

Inspection of Oral Cavity


Philtrum
Soft palate
Palatopharyngeal arch
Uvula of palate
Palatoglossal arch
Palatine tonsil
Posterior wall of oropharynx

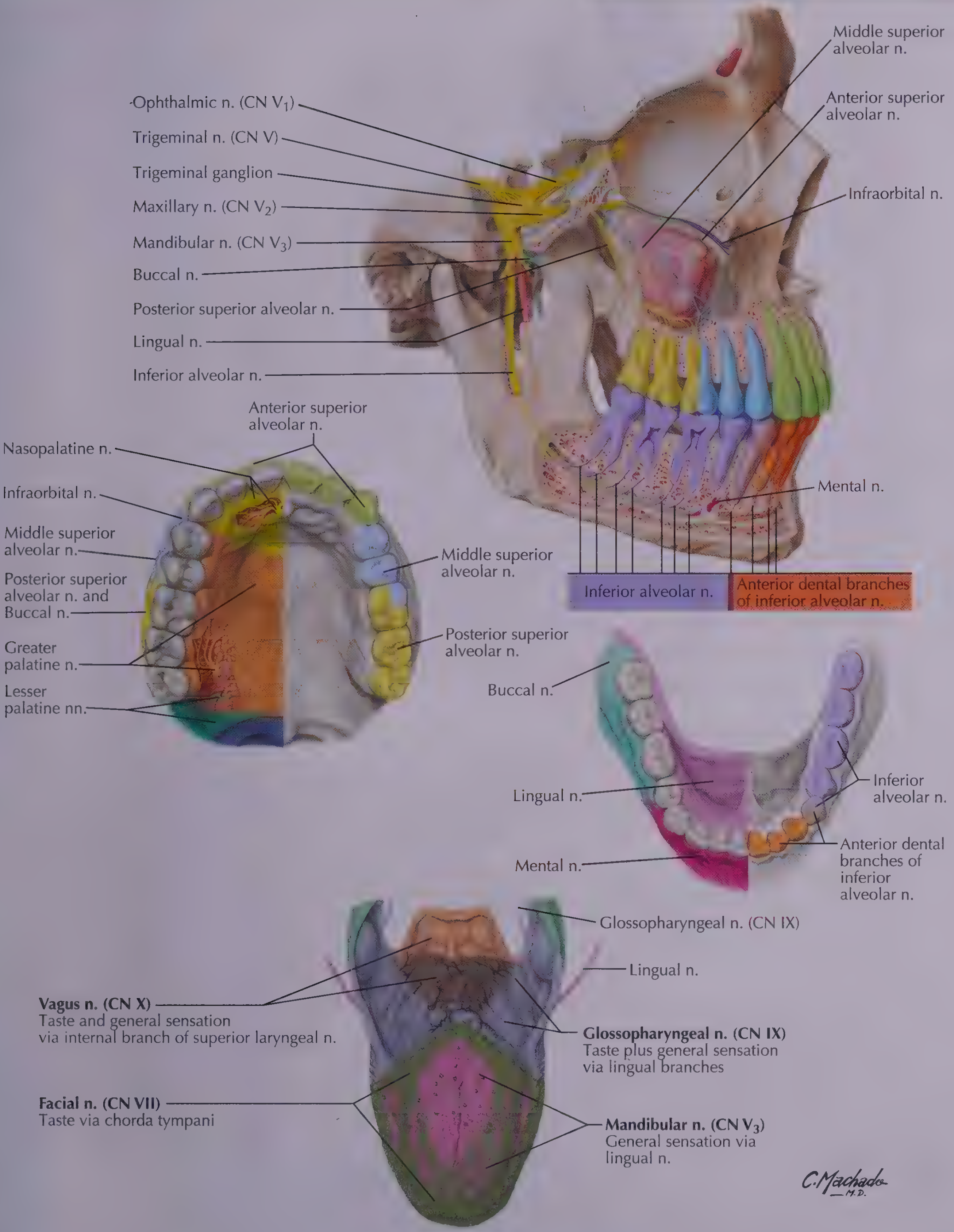

Frenulum of upper lip
Lingual glands
Lingual n.
Deep lingual a. and v.
Fimbriated fold
Submandibular duct (of Wharton)
Sublingual gland
Frenulum of tongue
Sublingual fold (with openings of sublingual ducts)
Sublingual caruncle (with opening of submandibular duct)
Frenulum of lower lip


Tubercle of upper lip
Papilla of parotid duct

F. Netter M.D.

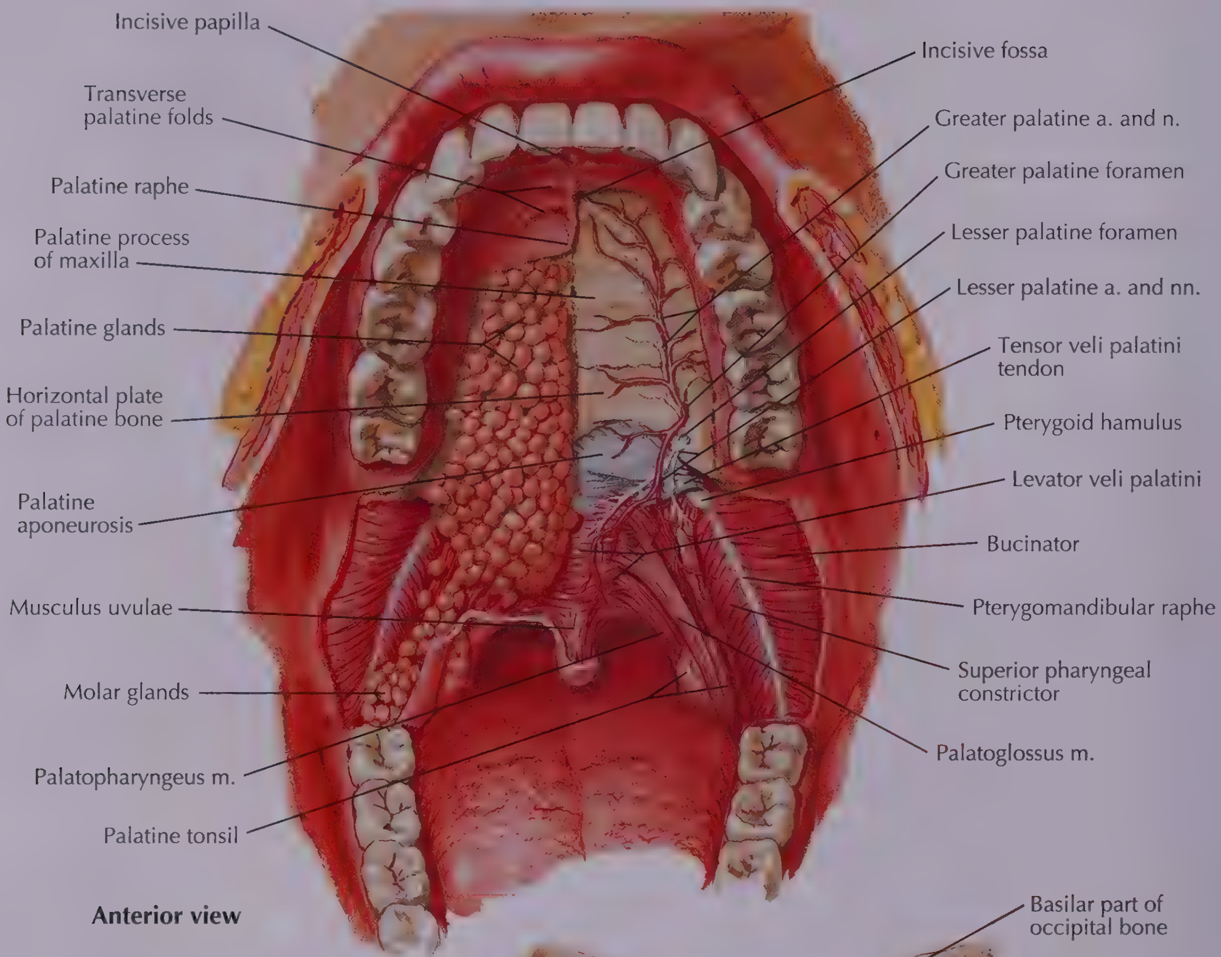
Afferent Innervation of Oral Cavity and Tongue

See also Plates 77, 79, 160, 162, BP 26

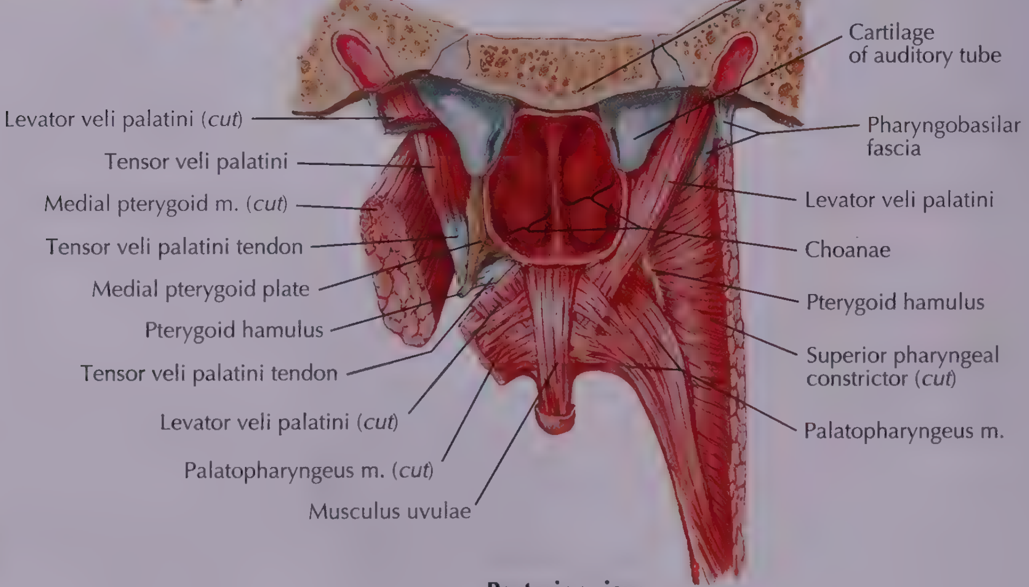

Ophthalmic n. (CN V_1)
Trigeminal n. (CN V)
Trigeminal ganglion
Maxillary n. (CN V_2)
Mandibular n. (CN V_3)
Buccal n.
Posterior superior alveolar n.
Lingual n.
Inferior alveolar n.
Middle superior alveolar n.
Anterior superior alveolar n.
Infraorbital n.
Mental n.
Inferior alveolar n.
Anterior dental branches of inferior alveolar n.
Anterior superior alveolar n.
Nasopalatine n.
Infraorbital n.
Middle superior alveolar n.
Posterior superior alveolar n. and Buccal n.
Greater palatine n.
Lesser palatine nn.
Middle superior alveolar n.
Posterior superior alveolar n.
Buccal n.
Lingual n.
Mental n.
Inferior alveolar n.
Anterior dental branches of inferior alveolar n.
Glossopharyngeal n. (CN IX)
Lingual n.
Vagus n. (CN X)
Taste and general sensation via internal branch of superior laryngeal n.
Glossopharyngeal n. (CN IX)
Taste plus general sensation via lingual branches
Facial n. (CN VII)
Taste via chorda tympani
Mandibular n. (CN V_3)
General sensation via lingual n.
C. Machado M.D.

Roof of Oral Cavity

See also Plates 66, 79, BP 26


Incisive papilla
Transverse palatine folds
Palatine raphe
Palatine process of maxilla
Palatine glands
Horizontal plate of palatine bone
Palatine aponeurosis
Musculus uvulae
Molar glands
Palatopharyngeus m.
Palatine tonsil
Incisive fossa
Greater palatine a. and n.
Greater palatine foramen
Lesser palatine foramen
Lesser palatine a. and nn.
Tensor veli palatini tendon
Pterygoid hamulus
Levator veli palatini
Bucinator
Pterygomandibular raphe
Superior pharyngeal constrictor
Palatoglossus m.

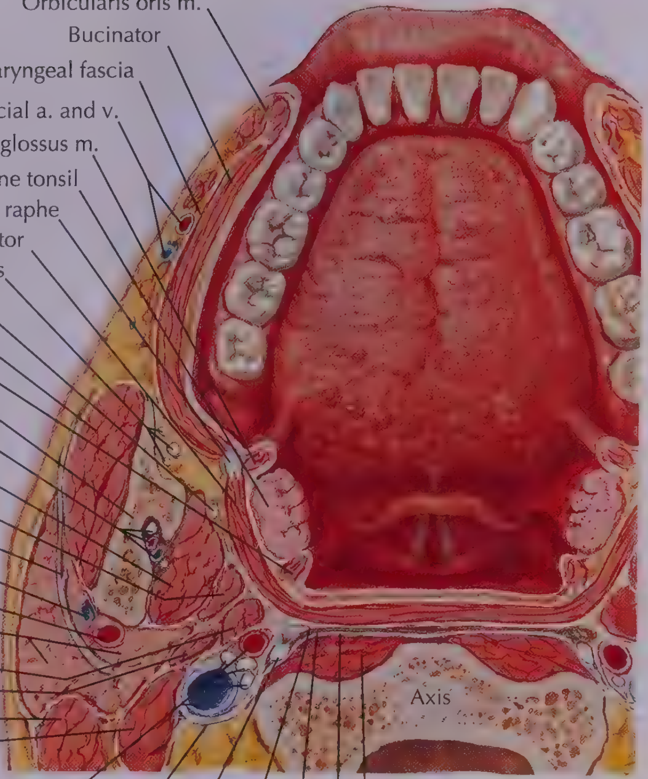
Anterior view

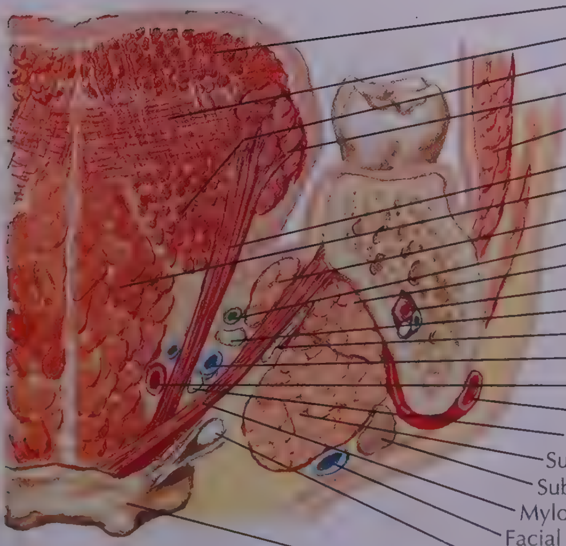

Basilar part of occipital bone
Cartilage of auditory tube
Pharyngobasilar fascia
Levator veli palatini
Choanae
Pterygoid hamulus
Superior pharyngeal constrictor (*cut*)
Palatopharyngeus m.
Levator veli palatini (*cut*)
Tensor veli palatini
Medial pterygoid m. (*cut*)
Tensor veli palatini tendon
Medial pterygoid plate
Pterygoid hamulus
Tensor veli palatini tendon
Levator veli palatini (*cut*)
Palatopharyngeus m. (*cut*)
Musculus uvulae

Posterior view

See also Plate 77

Horizontal section below lingula of mandible (superior view)

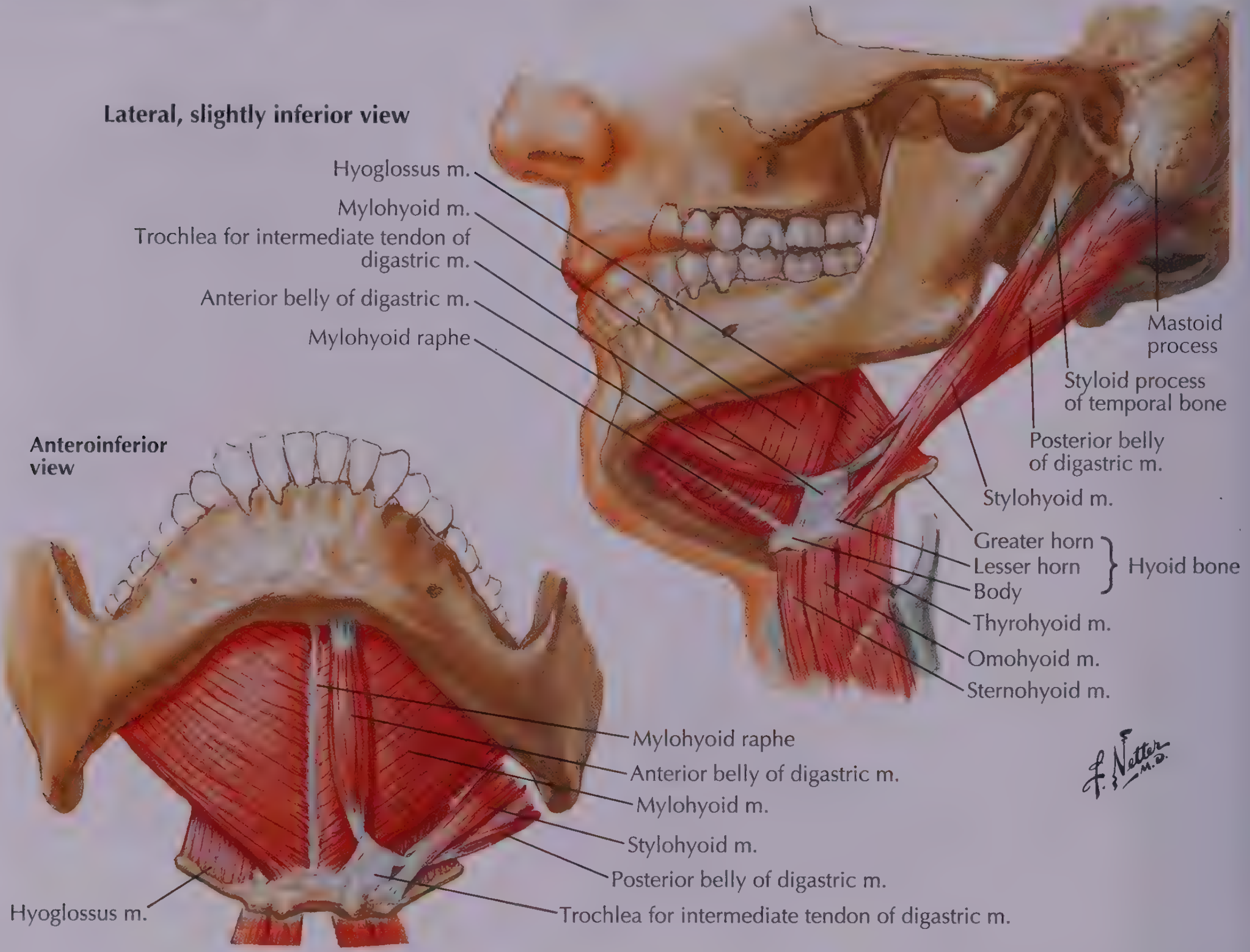

Orbicularis oris m.
Bucinator
Buccopharyngeal fascia
Facial a. and v.
Palatoglossus m.
Palatine tonsil
Pterygomandibular raphe
Superior pharyngeal constrictor
Buccal n. and branches
Lingual n.
Masseter
Palatopharyngeus m.
Ramus of mandible
Inferior alveolar a., v., and n.
Medial pterygoid m.
Styloglossus m.
Facial n. (CN VII)
Retromandibular v.
External carotid a.
Parotid gland
Stylopharyngeus m.
Stylohyoid m.
Sternocleidomastoid m.
Posterior belly of digastric m.
Internal jugular v., internal carotid a., and CN IX, CN X, and CN XII
Carotid sheath
Superior cervical ganglion
Axis
Longus capitis m.
Deep investing cervical fascia
Buccopharyngeal fascia
Retropharyngeal space


Superior longitudinal lingual m.
Verticalis and transversus linguae mm.
Inferior longitudinal lingual m.
Styloglossus m.
Bucinator
Hyoglossus m.
Genioglossus m.
Sublingual gland
Submandibular duct (of Wharton)
Submandibular gland
Inferior alveolar a., v., and n.
Lingual n.
Nerve to mylohyoid m.
Vena comitans of hypoglossal n.
Lingual a.
Facial a.
Hypoglossal n. (CN XII)
Submandibular gland
Submandibular node
Mylohyoid m.
Facial v.
Intermediate tendon of digastic m.
Hyoid bone

Coronal section posterior to 1st molar tooth (anterior view)

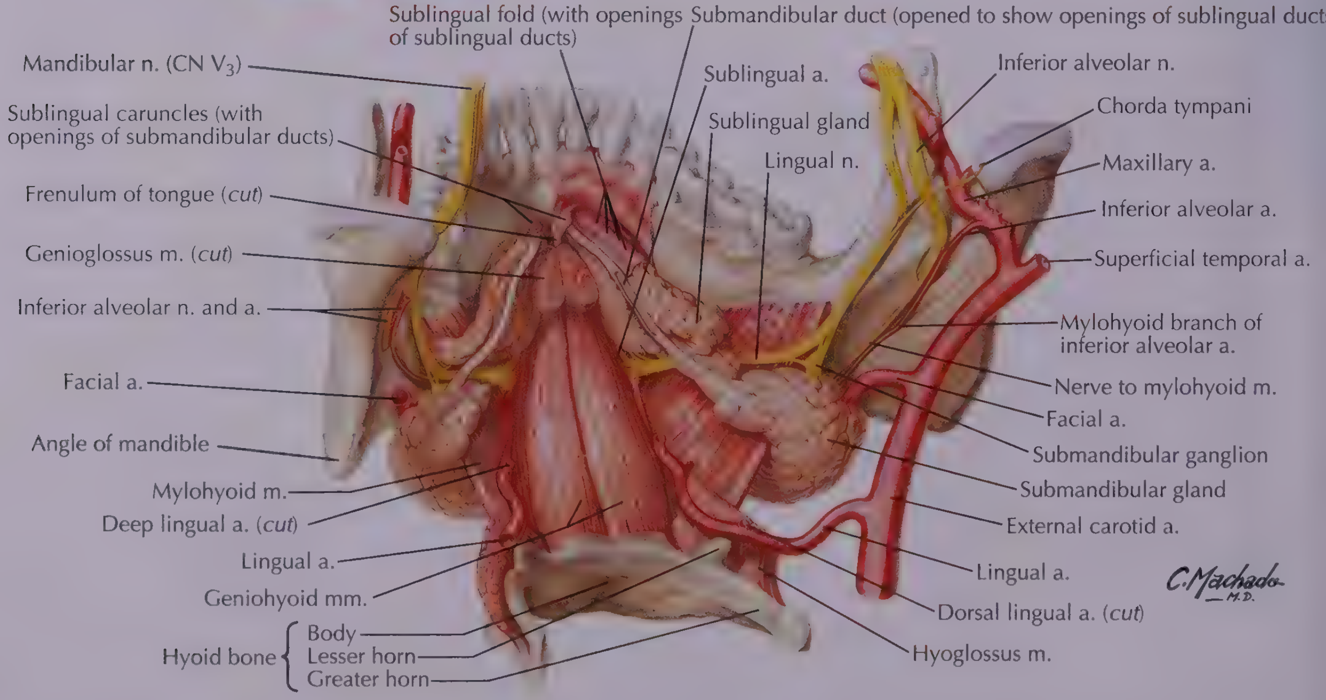
Suprahyoid Muscles

See also Plates 53, 77

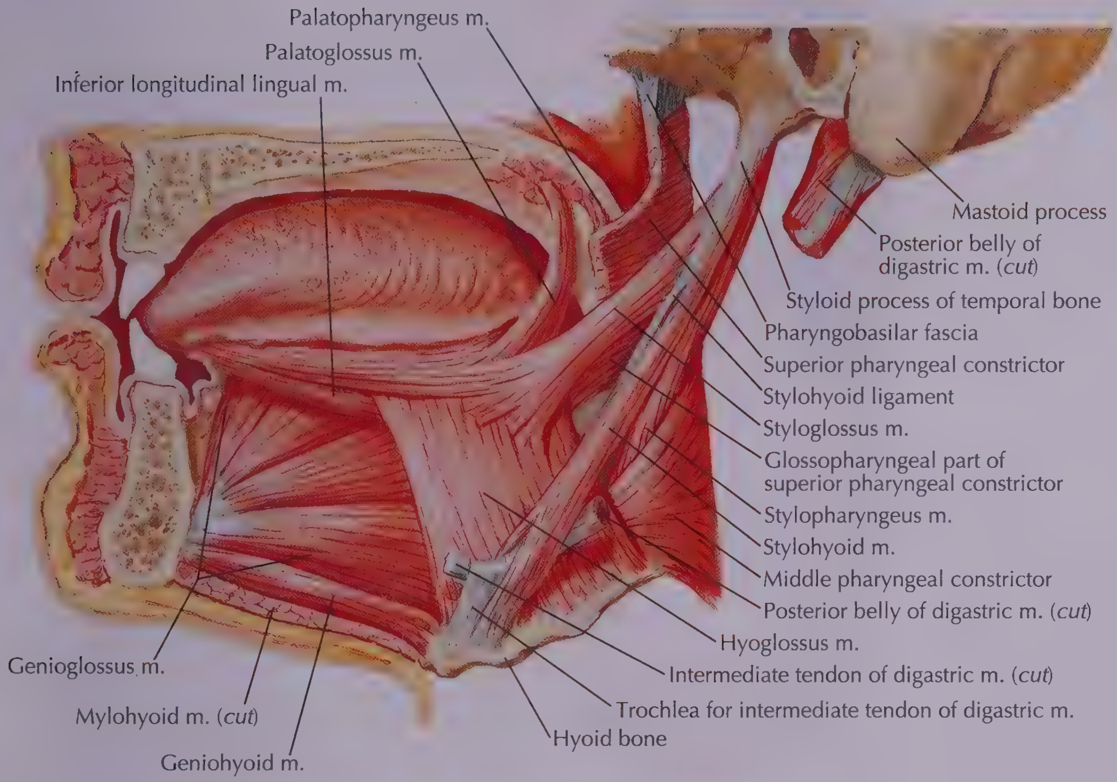

Lateral, slightly inferior view

Anteroinferior view

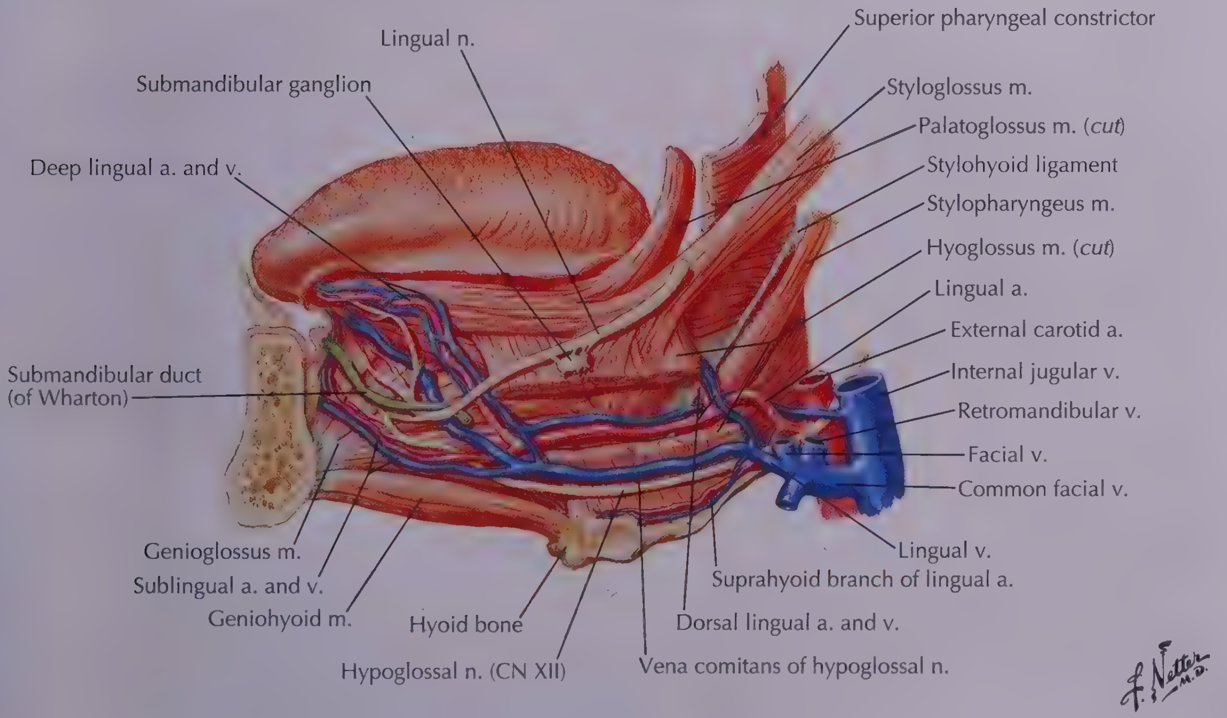
Hyoglossus m.
Mylohyoid m.
Trochlea for intermediate tendon of digastric m.
Anterior belly of digastric m.
Mylohyoid raphe
Mastoid process
Styloid process of temporal bone
Posterior belly of digastric m.
Stylohyoid m.
Greater horn
Lesser horn
Body
Hyoid bone
Thyrohyoid m.
Omohyoid m.
Sternohyoid m.
F. Netter M.D.
Mylohyoid raphe
Anterior belly of digastric m.
Mylohyoid m.
Stylohyoid m.
Posterior belly of digastric m.
Trochlea for intermediate tendon of digastric m.
Hyoglossus m.

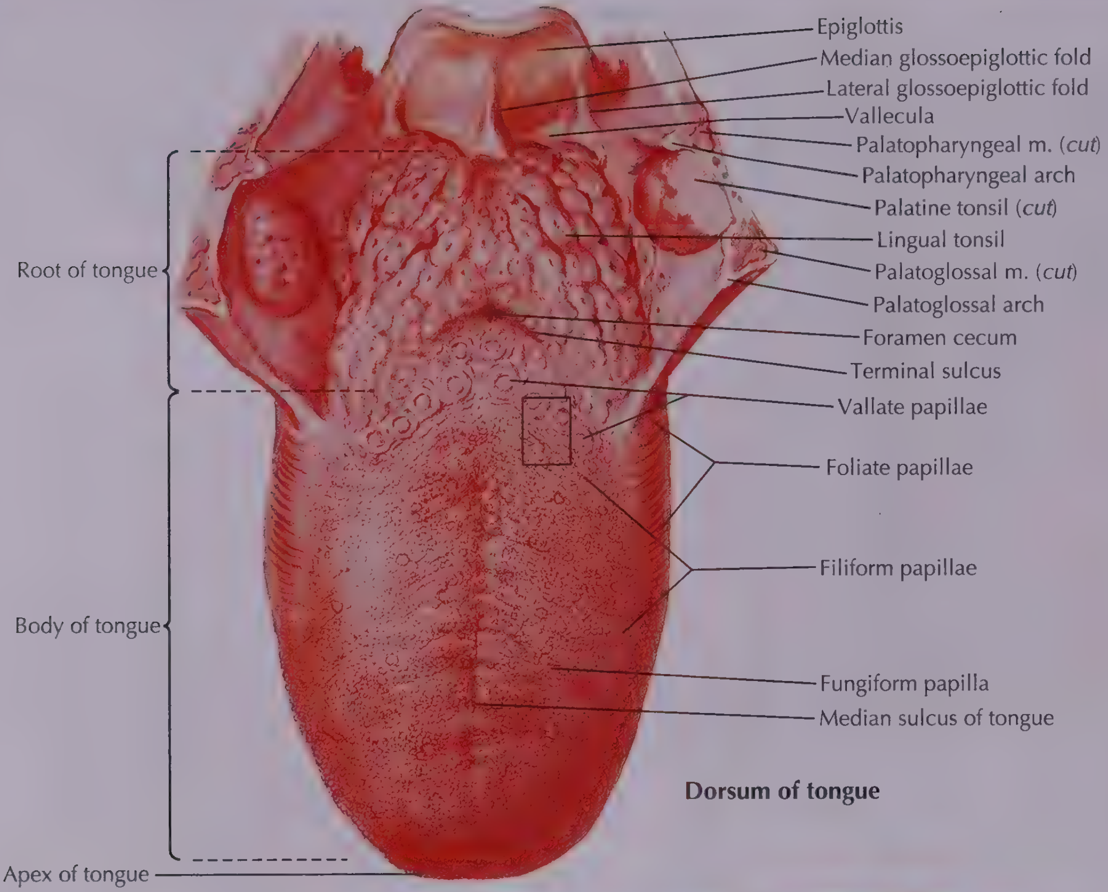

Sublingual fold (with openings of sublingual ducts)
Submandibular duct (opened to show openings of sublingual ducts)
Mandibular n. (CN V3)
Sublingual caruncles (with openings of submandibular ducts)
Frenulum of tongue (cut)
Genioglossus m. (cut)
Inferior alveolar n. and a.
Facial a.
Angle of mandible
Mylohyoid m.
Deep lingual a. (cut)
Lingual a.
Geniohyoid mm.
Hyoid bone
Body
Lesser horn
Greater horn
Sublingual a.
Sublingual gland
Lingual n.
Inferior alveolar n.
Chorda tympani
Maxillary a.
Inferior alveolar a.
Superficial temporal a.
Mylohyoid branch of inferior alveolar a.
Nerve to mylohyoid m.
Facial a.
Submandibular ganglion
Submandibular gland
External carotid a.
Lingual a.
Dorsal lingual a. (cut)
Hyoglossus m.
C. Machado M.D.

See also Plates 87, 155, 162

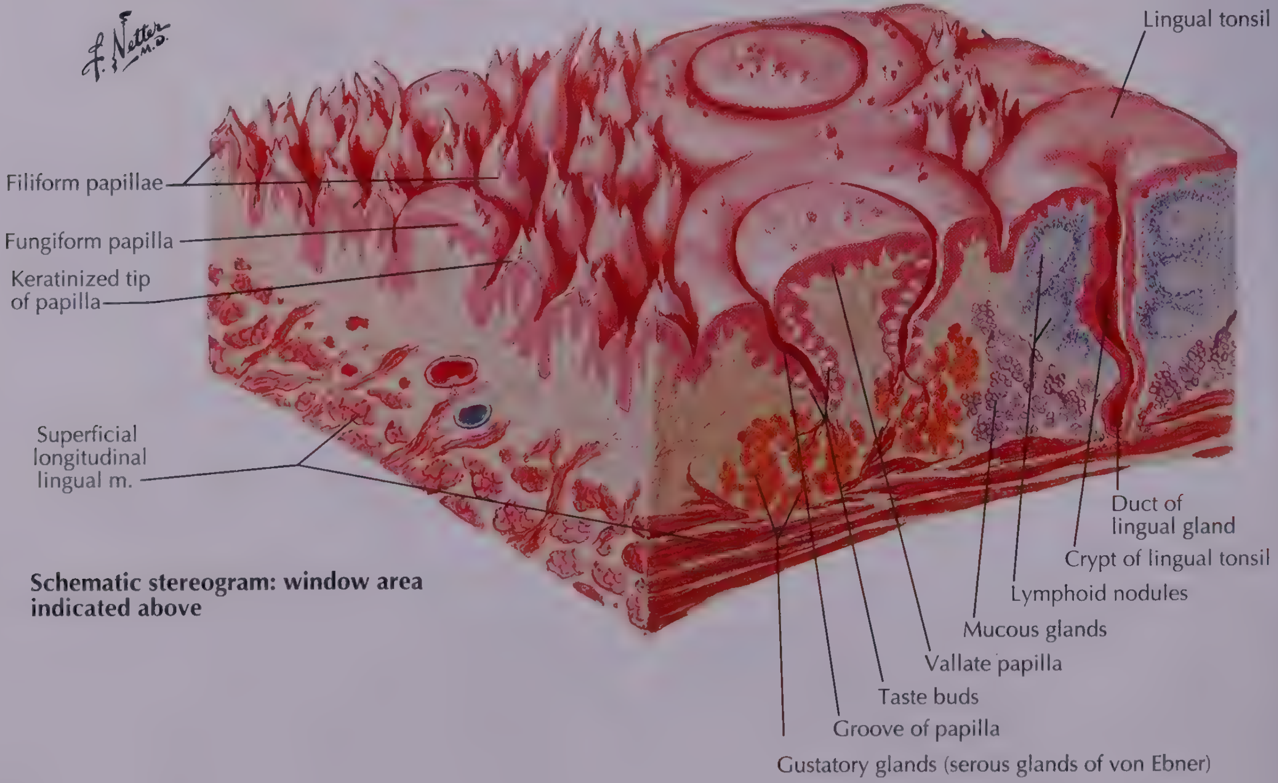

Palatopharyngeus m.
Palatoglossus m.
Inferior longitudinal lingual m.
Mastoid process
Posterior belly of digastric m. (*cut*)
Styloid process of temporal bone
Pharyngobasilar fascia
Superior pharyngeal constrictor
Stylohyoid ligament
Styloglossus m.
Glossopharyngeal part of superior pharyngeal constrictor
Stylopharyngeus m.
Stylohyoid m.
Middle pharyngeal constrictor
Posterior belly of digastric m. (*cut*)
Hyoglossus m.
Intermediate tendon of digastric m. (*cut*)
Trochlea for intermediate tendon of digastric m.
Hyoid bone
Genioglossus m.
Mylohyoid m. (*cut*)
Geniohyoid m.

Lateral view (left side of mandible removed)


Superior pharyngeal constrictor
Lingual n.
Submandibular ganglion
Deep lingual a. and v.
Styloglossus m.
Palatoglossus m. (*cut*)
Stylohyoid ligament
Stylopharyngeus m.
Hyoglossus m. (*cut*)
Lingual a.
External carotid a.
Internal jugular v.
Submandibular duct (of Wharton)
Retromandibular v.
Facial v.
Common facial v.
Lingual v.
Genioglossus m.
Sublingual a. and v.
Suprahyoid branch of lingual a.
Geniohyoid m.
Hyoid bone
Dorsal lingual a. and v.
Hypoglossal n. (CN XII)
Vena comitans of hypoglossal n.
F. Netter M.D.

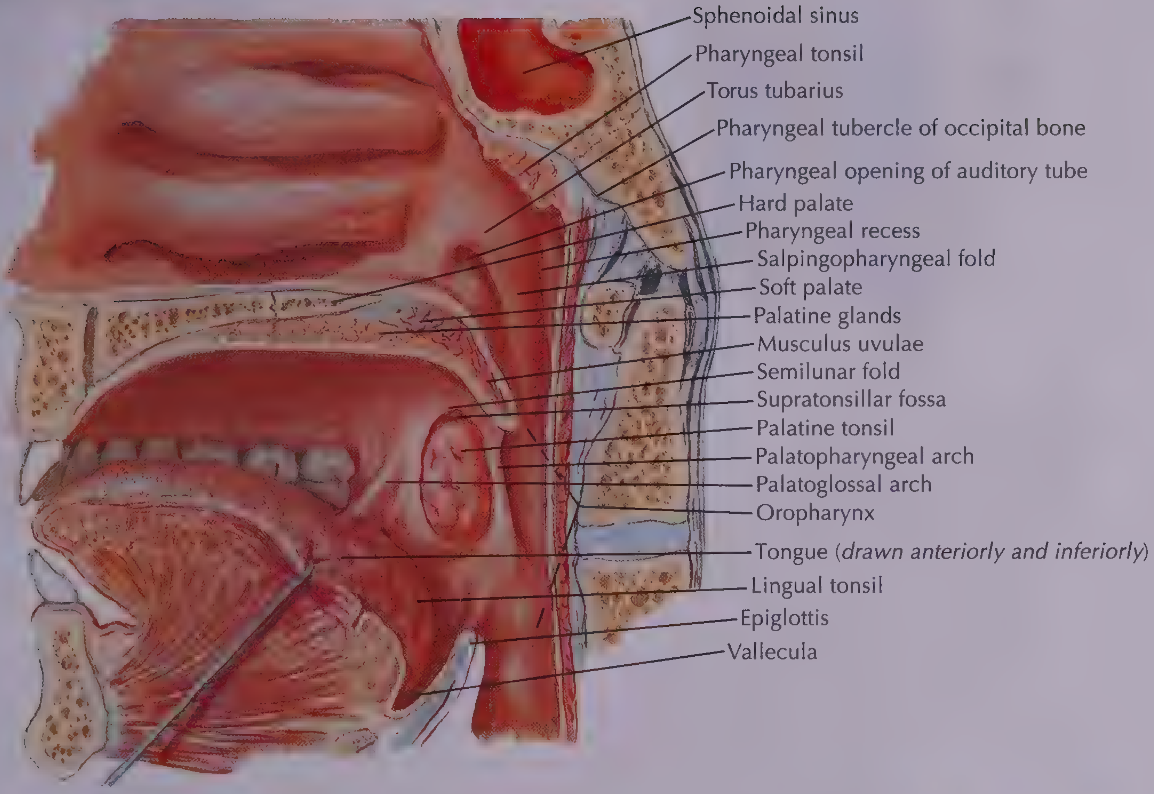

Epiglottis
Median glossoepiglottic fold
Lateral glossoepiglottic fold
Vallecula
Palatopharyngeal m. (*cut*)
Palatopharyngeal arch
Palatine tonsil (*cut*)
Lingual tonsil
Palatoglossal m. (*cut*)
Palatoglossal arch
Foramen cecum
Terminal sulcus
Vallate papillae
Foliate papillae
Filiform papillae
Fungiform papilla
Median sulcus of tongue
Root of tongue
Body of tongue
Apex of tongue

Dorsum of tongue


Lingual tonsil
Filiform papillae
Fungiform papilla
Keratinized tip of papilla
Superficial longitudinal lingual m.
Duct of lingual gland
Crypt of lingual tonsil
Lymphoid nodules
Mucous glands
Vallate papilla
Taste buds
Groove of papilla
Gustatory glands (serous glands of von Ebner)

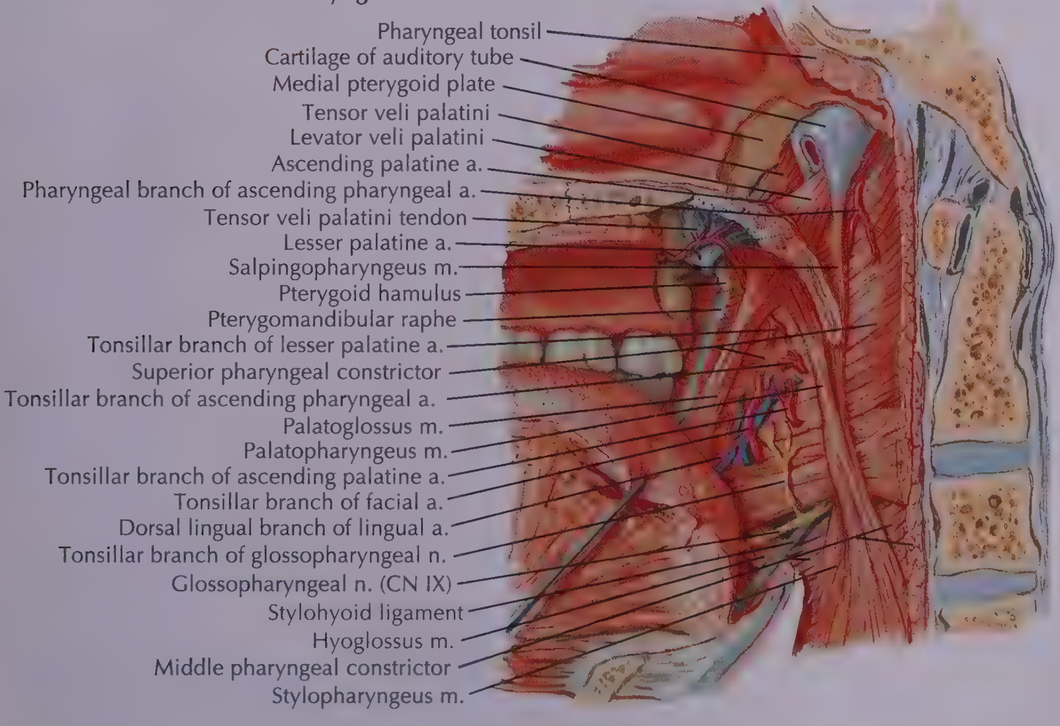
Schematic stereogram: window area indicated above

See also Plate 76



Medial view sagittal section

Sphenoidal sinus
Pharyngeal tonsil
Torus tubarius
Pharyngeal tubercle of occipital bone
Pharyngeal opening of auditory tube
Hard palate
Pharyngeal recess
Salpingopharyngeal fold
Soft palate
Palatine glands
Musculus uvulae
Semilunar fold
Supratonsillar fossa
Palatine tonsil
Palatopharyngeal arch
Palatoglossal arch
Oropharynx
Tongue (*drawn anteriorly and inferiorly*)
Lingual tonsil
Epiglottis
Vallecula



Pharyngeal mucosa removed

Pharyngeal tonsil
Cartilage of auditory tube
Medial pterygoid plate
Tensor veli palatini
Levator veli palatini
Ascending palatine a.
Pharyngeal branch of ascending pharyngeal a.
Tensor veli palatini tendon
Lesser palatine a.
Salpingopharyngeus m.
Pterygoid hamulus
Pterygomandibular raphe
Tonsillar branch of lesser palatine a.
Superior pharyngeal constrictor
Tonsillar branch of ascending pharyngeal a.
Palatoglossus m.
Palatopharyngeus m.
Tonsillar branch of ascending palatine a.
Tonsillar branch of facial a.
Dorsal lingual branch of lingual a.
Tonsillar branch of glossopharyngeal n.
Glossopharyngeal n. (CN IX)
Stylohyoid ligament
Hyoglossus m.
Middle pharyngeal constrictor
Stylopharyngeus m.

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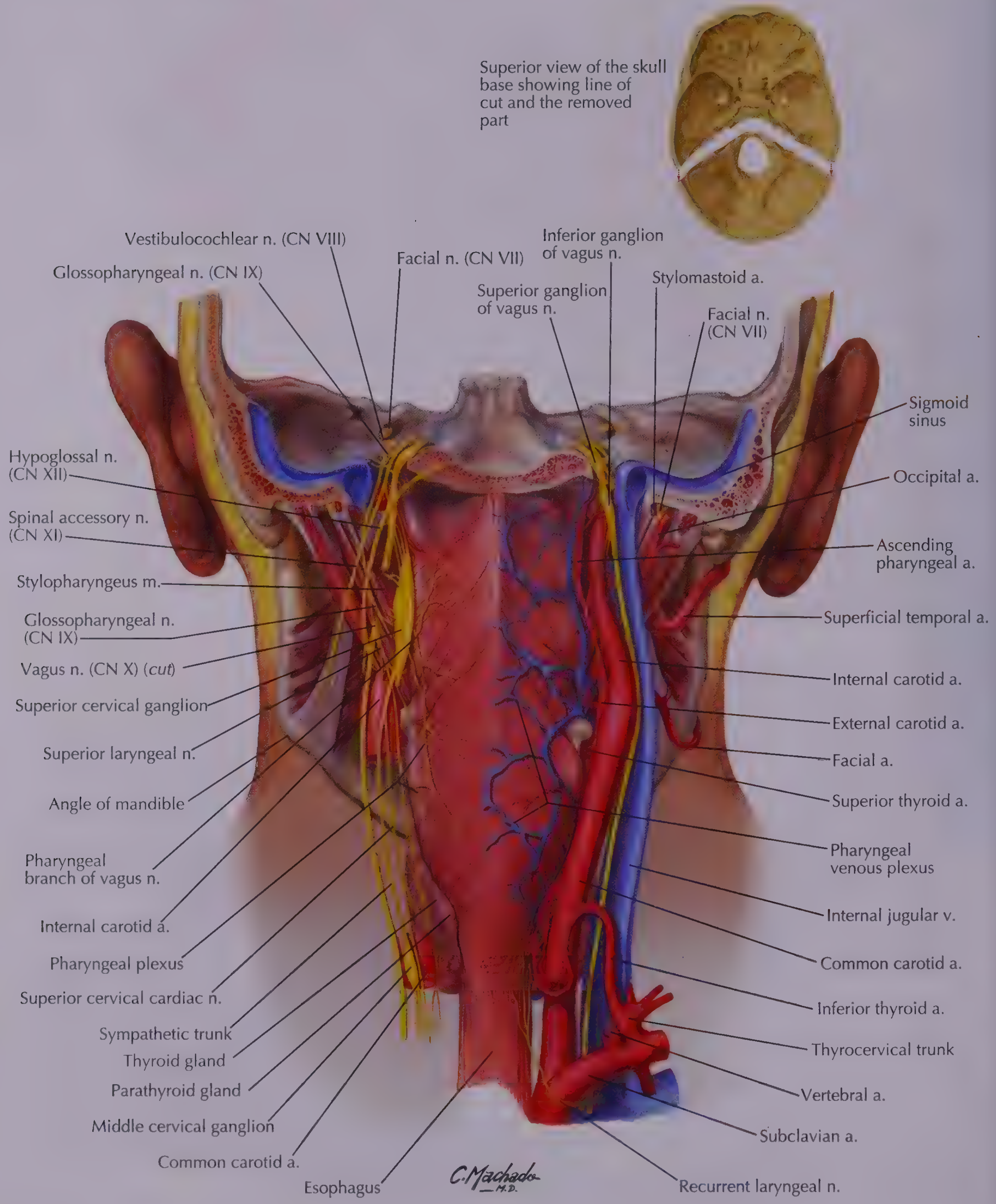
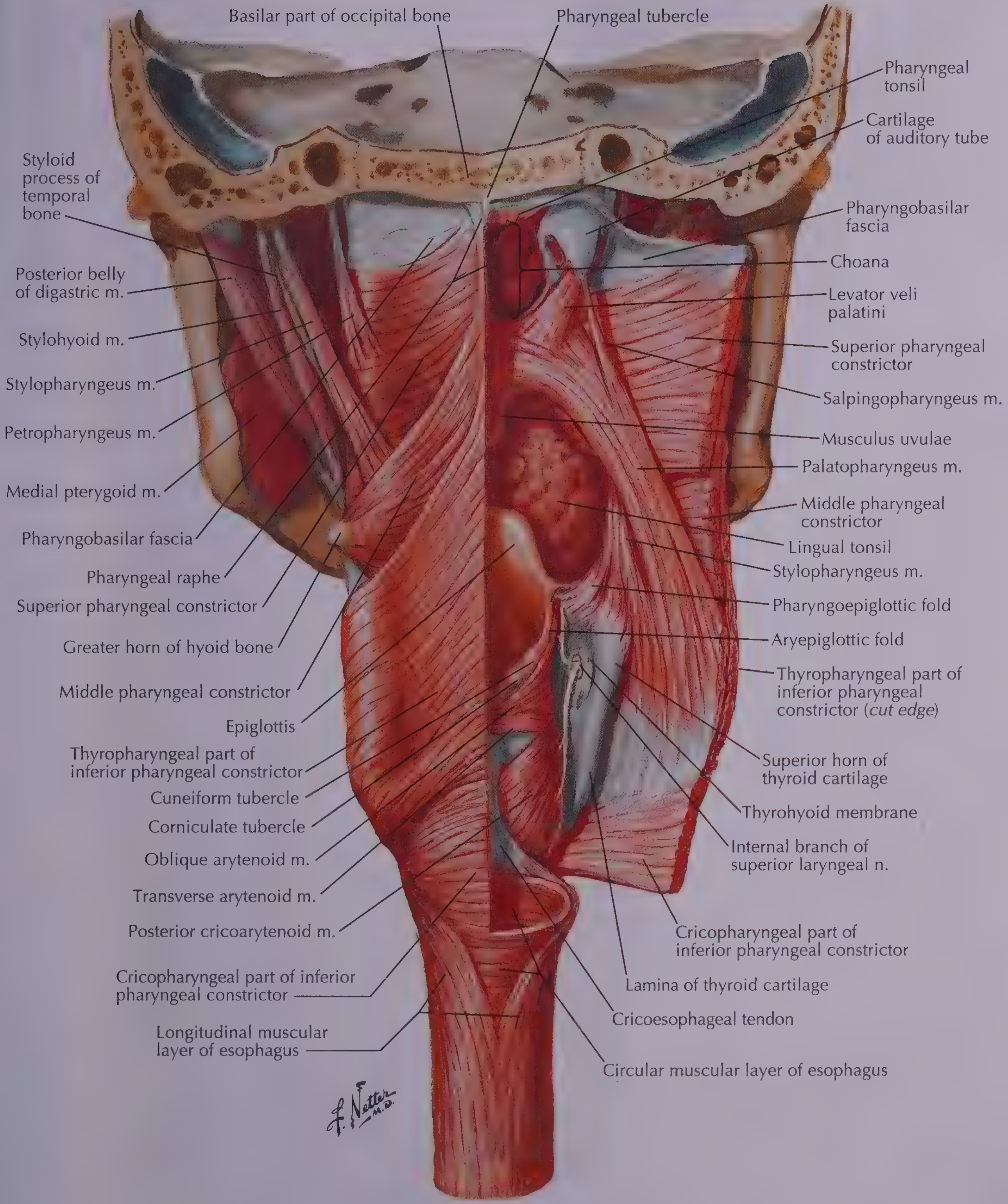
Posterior View of Pharynx: Nerves and Vessels

See also Plates 92, 93, 98, 99

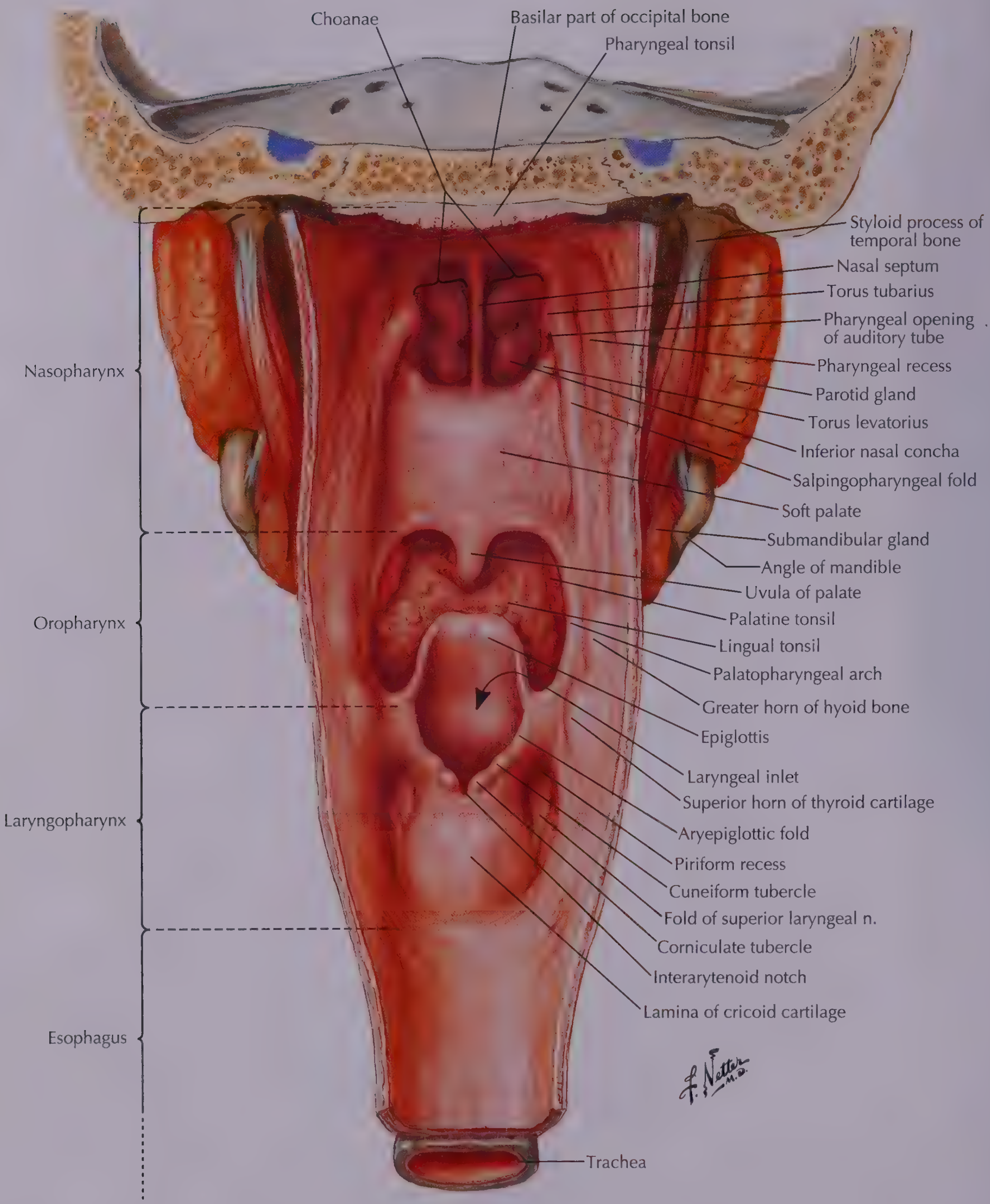

Superior view of the skull base showing line of cut and the removed part
Vestibulocochlear n. (CN VIII)
Glossopharyngeal n. (CN IX)
Facial n. (CN VII)
Inferior ganglion of vagus n.
Superior ganglion of vagus n.
Stylomastoid a.
Facial n. (CN VII)
Sigmoid sinus
Occipital a.
Ascending pharyngeal a.
Superficial temporal a.
Internal carotid a.
External carotid a.
Facial a.
Superior thyroid a.
Pharyngeal venous plexus
Internal jugular v.
Common carotid a.
Inferior thyroid a.
Thyrocervical trunk
Vertebral a.
Subclavian a.
Recurrent laryngeal n.
Hypoglossal n. (CN XII)
Spinal accessory n. (CN XI)
Stylopharyngeus m.
Glossopharyngeal n. (CN IX)
Vagus n. (CN X) (*cut*)
Superior cervical ganglion
Superior laryngeal n.
Angle of mandible
Pharyngeal branch of vagus n.
Internal carotid a.
Pharyngeal plexus
Superior cervical cardiac n.
Sympathetic trunk
Thyroid gland
Parathyroid gland
Middle cervical ganglion
Common carotid a.
Esophagus
C. Machado M.D.

Muscles of Pharynx: Partially Opened Posterior View

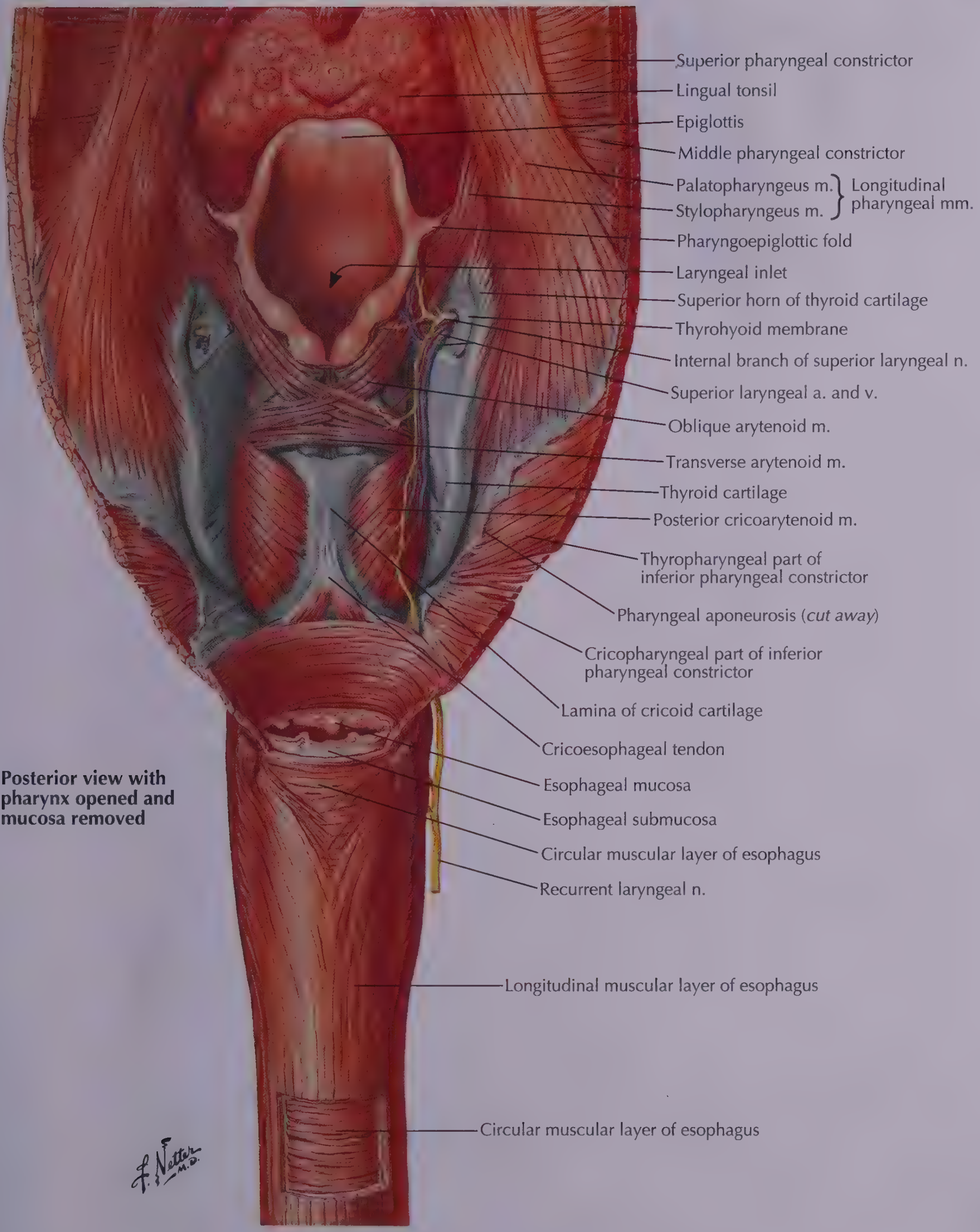
See also Plates 91, 97


Basilar part of occipital bone
Pharyngeal tubercle
Styloid process of temporal bone
Posterior belly of digastric m.
Stylohyoid m.
Stylopharyngeus m.
Petropharyngeus m.
Medial pterygoid m.
Pharyngobasilar fascia
Pharyngeal raphe
Superior pharyngeal constrictor
Greater horn of hyoid bone
Middle pharyngeal constrictor
Epiglottis
Thyropharyngeal part of inferior pharyngeal constrictor
Cuneiform tubercle
Corniculate tubercle
Oblique arytenoid m.
Transverse arytenoid m.
Posterior cricoarytenoid m.
Cricopharyngeal part of inferior pharyngeal constrictor
Longitudinal muscular layer of esophagus
Pharyngeal tonsil
Cartilage of auditory tube
Pharyngobasilar fascia
Choana
Levator veli palatini
Superior pharyngeal constrictor
Salpingopharyngeus m.
Musculus uvulae
Palatopharyngeus m.
Middle pharyngeal constrictor
Lingual tonsil
Stylopharyngeus m.
Pharyngoepiglottic fold
Aryepiglottic fold
Thyropharyngeal part of inferior pharyngeal constrictor (*cut edge*)
Superior horn of thyroid cartilage
Thyrohyoid membrane
Internal branch of superior laryngeal n.
Cricopharyngeal part of inferior pharyngeal constrictor
Lamina of thyroid cartilage
Cricoesophageal tendon
Circular muscular layer of esophagus
F. Netter M.D.

Pharynx: Opened Posterior View

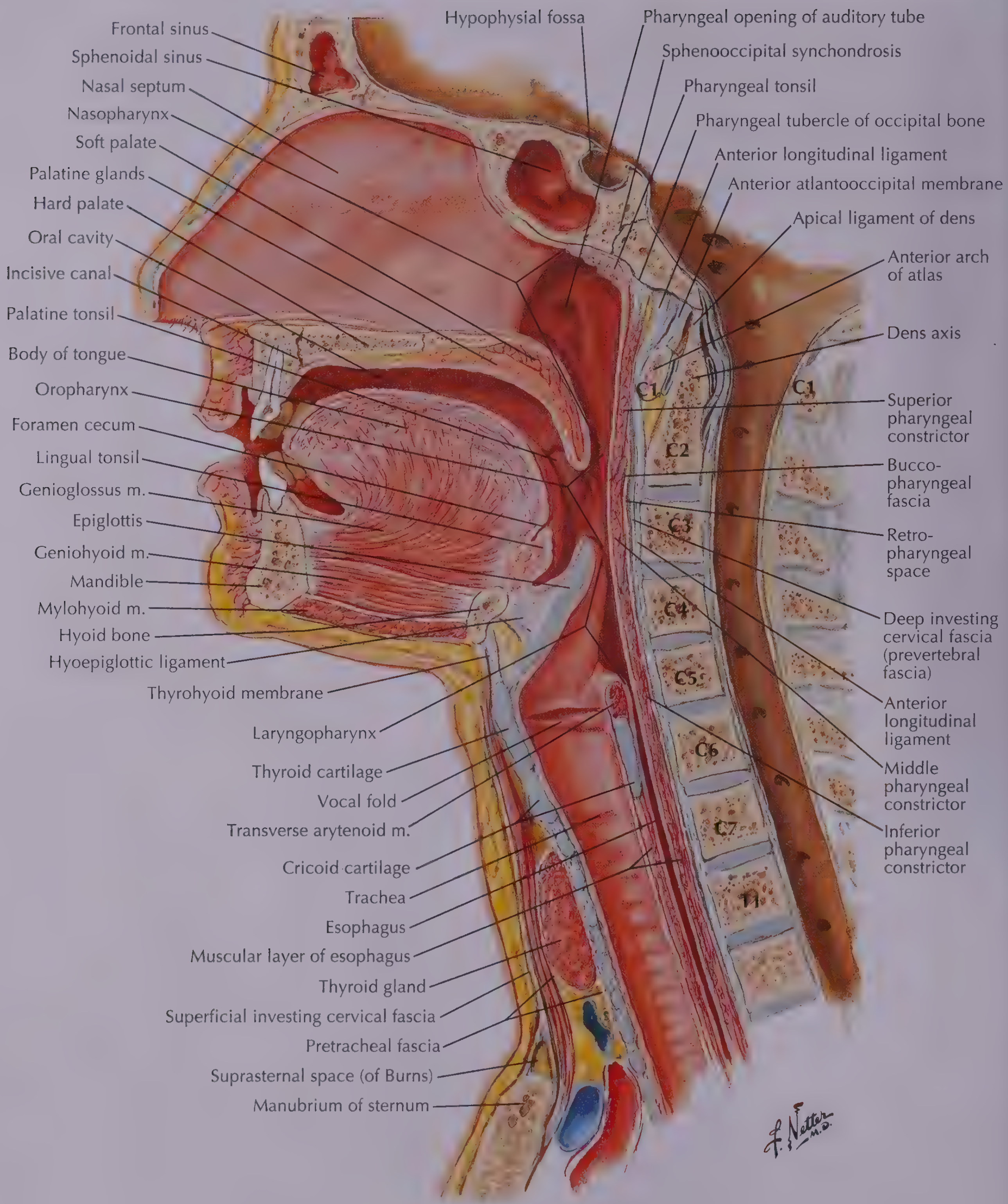

Choanae
Basilar part of occipital bone
Pharyngeal tonsil
Styloid process of temporal bone
Nasal septum
Torus tubarius
Pharyngeal opening of auditory tube
Pharyngeal recess
Parotid gland
Torus levatorius
Inferior nasal concha
Salpingopharyngeal fold
Soft palate
Submandibular gland
Angle of mandible
Uvula of palate
Palatine tonsil
Lingual tonsil
Palatopharyngeal arch
Greater horn of hyoid bone
Epiglottis
Laryngeal inlet
Superior horn of thyroid cartilage
Aryepiglottic fold
Piriform recess
Cuneiform tubercle
Fold of superior laryngeal n.
Corniculate tubercle
Interarytenoid notch
Lamina of cricoid cartilage
Trachea
Nasopharynx
Oropharynx
Laryngopharynx
Esophagus

See also Plates 106, 107, 108


Superior pharyngeal constrictor
Lingual tonsil
Epiglottis
Middle pharyngeal constrictor
Palatopharyngeus m.
Stylopharyngeus m.
Longitudinal pharyngeal mm.
Pharyngoepiglottic fold
Laryngeal inlet
Superior horn of thyroid cartilage
Thyrohyoid membrane
Internal branch of superior laryngeal n.
Superior laryngeal a. and v.
Oblique arytenoid m.
Transverse arytenoid m.
Thyroid cartilage
Posterior cricoarytenoid m.
Thyropharyngeal part of inferior pharyngeal constrictor
Pharyngeal aponeurosis (*cut away*)
Cricopharyngeal part of inferior pharyngeal constrictor
Lamina of cricoid cartilage
Cricoesophageal tendon
Esophageal mucosa
Esophageal submucosa
Circular muscular layer of esophagus
Recurrent laryngeal n.
Longitudinal muscular layer of esophagus
Circular muscular layer of esophagus
F. Netter M.D.

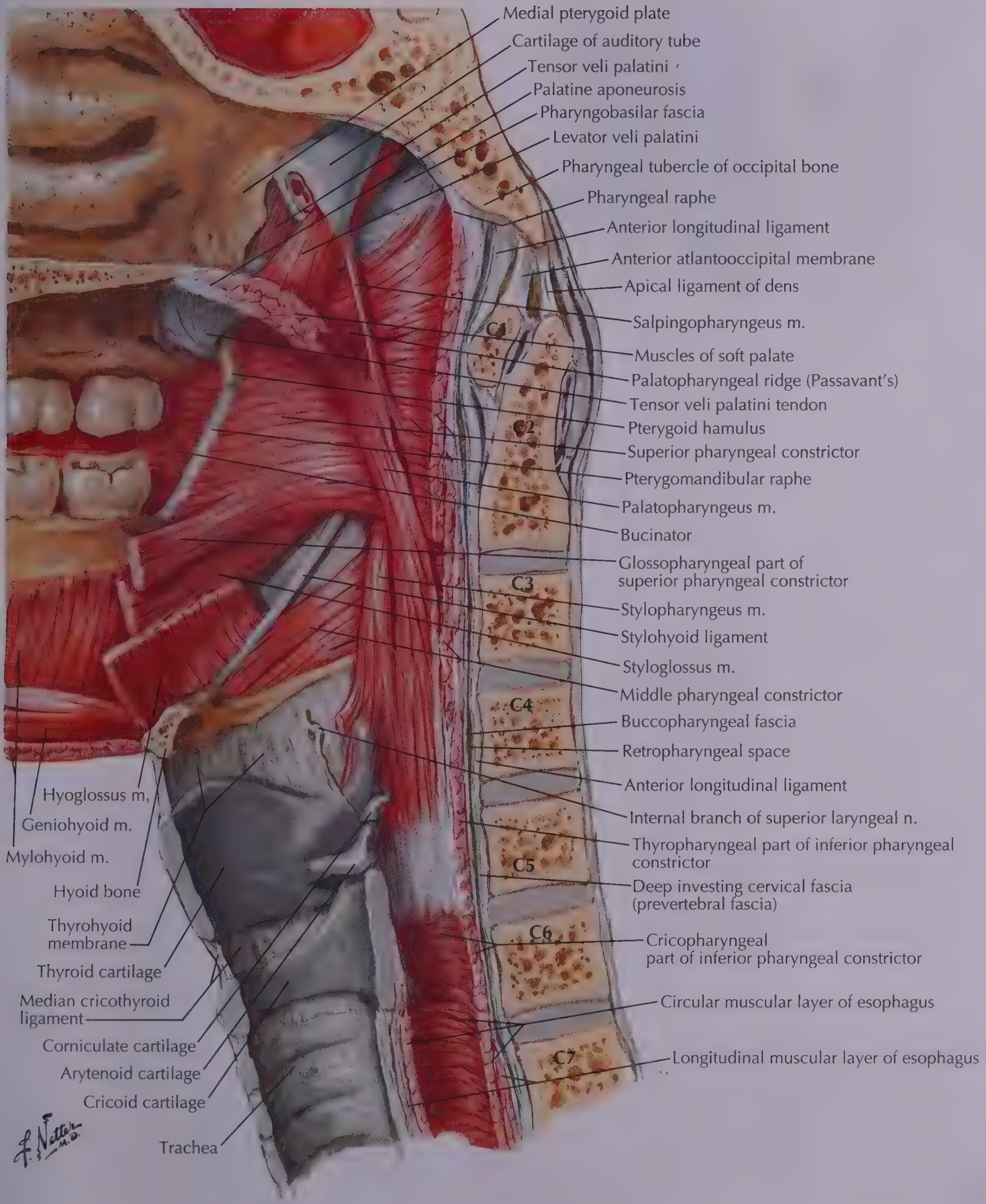
Posterior view with pharynx opened and mucosa removed

See also Plate BP 26


Frontal sinus
Sphenoidal sinus
Nasal septum
Nasopharynx
Soft palate
Palatine glands
Hard palate
Oral cavity
Incisive canal
Palatine tonsil
Body of tongue
Oropharynx
Foramen cecum
Lingual tonsil
Genioglossus m.
Epiglottis
Geniohyoid m.
Mandible
Mylohyoid m.
Hyoid bone
Hyoepiglottic ligament
Thyrohyoid membrane
Laryngopharynx
Thyroid cartilage
Vocal fold
Transverse arytenoid m.
Cricoid cartilage
Trachea
Esophagus
Muscular layer of esophagus
Thyroid gland
Superficial investing cervical fascia
Pretracheal fascia
Suprasternal space (of Burns)
Manubrium of sternum
Hypophysial fossa
Pharyngeal opening of auditory tube
Sphenooccipital synchondrosis
Pharyngeal tonsil
Pharyngeal tubercle of occipital bone
Anterior longitudinal ligament
Anterior atlantooccipital membrane
Apical ligament of dens
Anterior arch of atlas
Dens axis
Superior pharyngeal constrictor
Bucco-pharyngeal fascia
Retro-pharyngeal space
Deep investing cervical fascia (prevertebral fascia)
Anterior longitudinal ligament
Middle pharyngeal constrictor
Inferior pharyngeal constrictor
C1
C1
C2
C3
C4
C5
C6
C7
T1

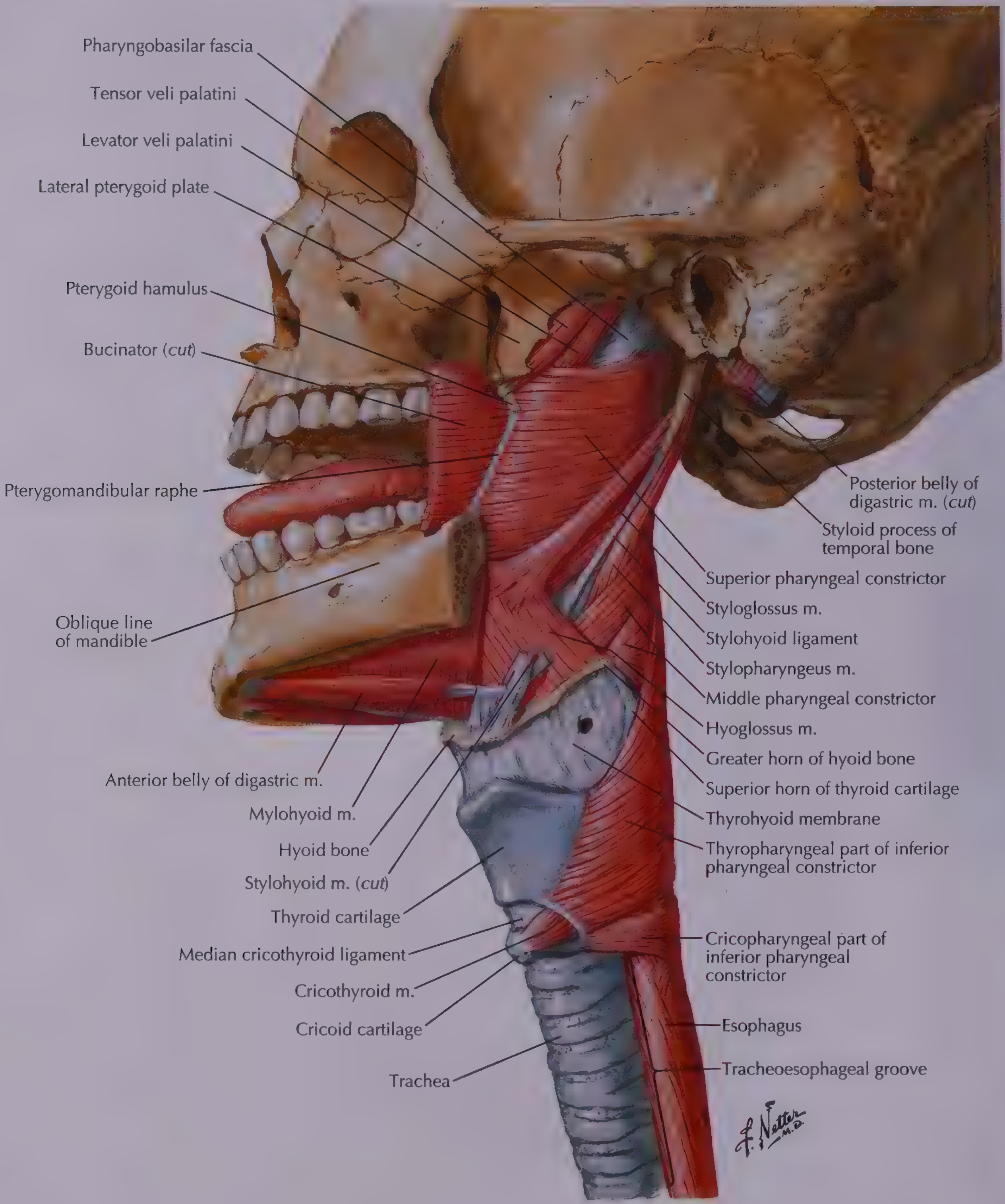
Muscles of Pharynx: Medial View

See also Plate 77


Medial pterygoid plate
Cartilage of auditory tube
Tensor veli palatini
Palatine aponeurosis
Pharyngobasilar fascia
Levator veli palatini
Pharyngeal tubercle of occipital bone
Pharyngeal raphe
Anterior longitudinal ligament
Anterior atlantooccipital membrane
Apical ligament of dens
Salpingopharyngeus m.
Muscles of soft palate
Palatopharyngeal ridge (Passavant's)
Tensor veli palatini tendon
Pterygoid hamulus
Superior pharyngeal constrictor
Pterygomandibular raphe
Palatopharyngeus m.
Bucinator
Glossopharyngeal part of superior pharyngeal constrictor
Stylopharyngeus m.
Stylohyoid ligament
Styloglossus m.
Middle pharyngeal constrictor
Buccopharyngeal fascia
Retropharyngeal space
Anterior longitudinal ligament
Internal branch of superior laryngeal n.
Thyropharyngeal part of inferior pharyngeal constrictor
Deep investing cervical fascia (prevertebral fascia)
Cricopharyngeal part of inferior pharyngeal constrictor
Circular muscular layer of esophagus
Longitudinal muscular layer of esophagus
C1
C2
C3
C4
C5
C6
C7
Hyoglossus m.
Geniohyoid m.
Mylohyoid m.
Hyoid bone
Thyrohyoid membrane
Thyroid cartilage
Median cricothyroid ligament
Corniculate cartilage
Arytenoid cartilage
Cricoid cartilage
Trachea
F. Netter M.D.

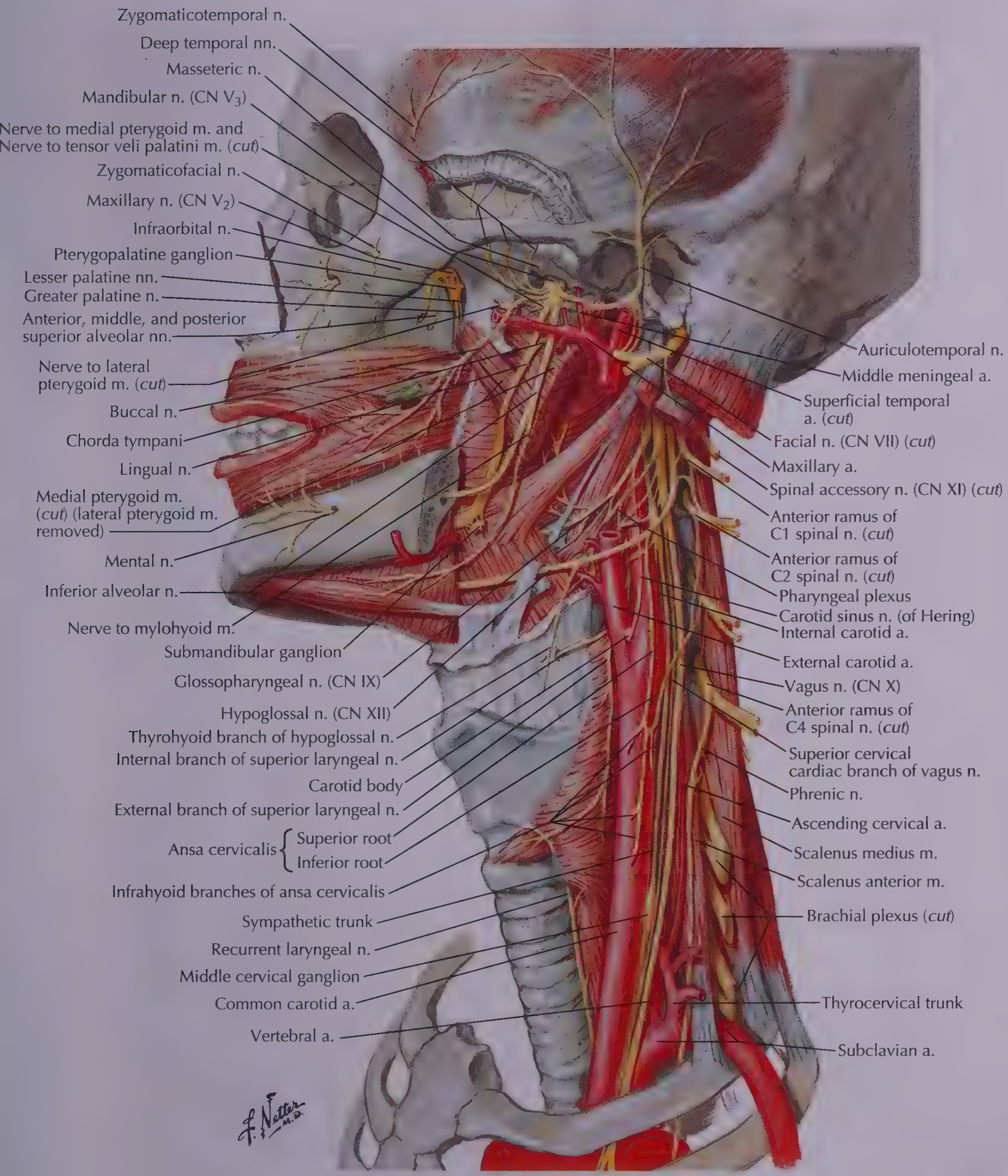
Muscles of Pharynx: Lateral View

See also Plate 92


Pharyngobasilar fascia
Tensor veli palatini
Levator veli palatini
Lateral pterygoid plate
Pterygoid hamulus
Bucinator (*cut*)
Pterygomandibular raphe
Oblique line of mandible
Anterior belly of digastric m.
Mylohyoid m.
Hyoid bone
Stylohyoid m. (*cut*)
Thyroid cartilage
Median cricothyroid ligament
Cricothyroid m.
Cricoid cartilage
Trachea
Posterior belly of digastric m. (*cut*)
Styloid process of temporal bone
Superior pharyngeal constrictor
Styloglossus m.
Stylohyoid ligament
Stylopharyngeus m.
Middle pharyngeal constrictor
Hyoglossus m.
Greater horn of hyoid bone
Superior horn of thyroid cartilage
Thyrohyoid membrane
Thyropharyngeal part of inferior pharyngeal constrictor
Cricopharyngeal part of inferior pharyngeal constrictor
Esophagus
Tracheoesophageal groove
F. Netter M.D.

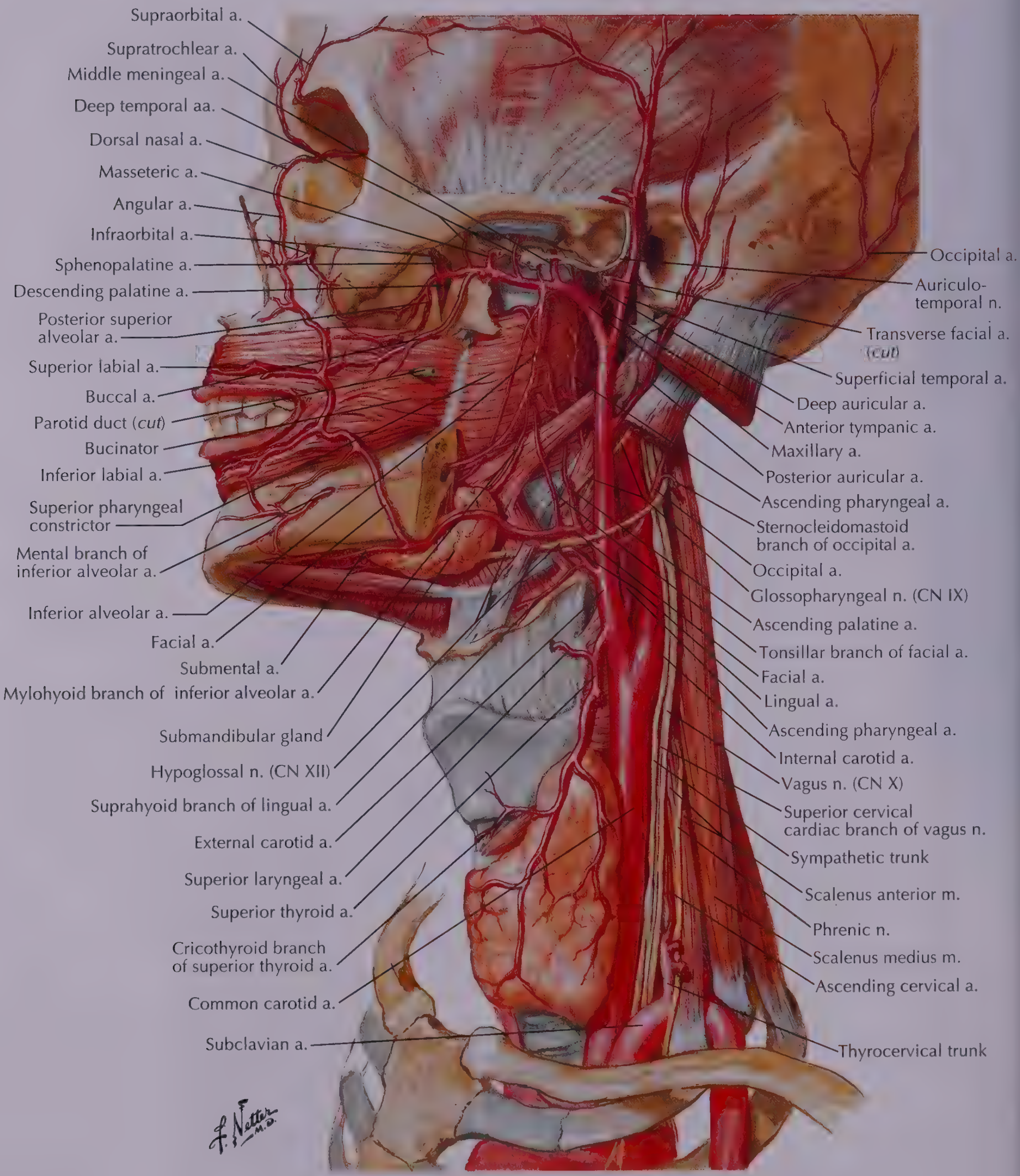
Nerves of Oral and Pharyngeal Regions

See also Plates 77, 149, 152

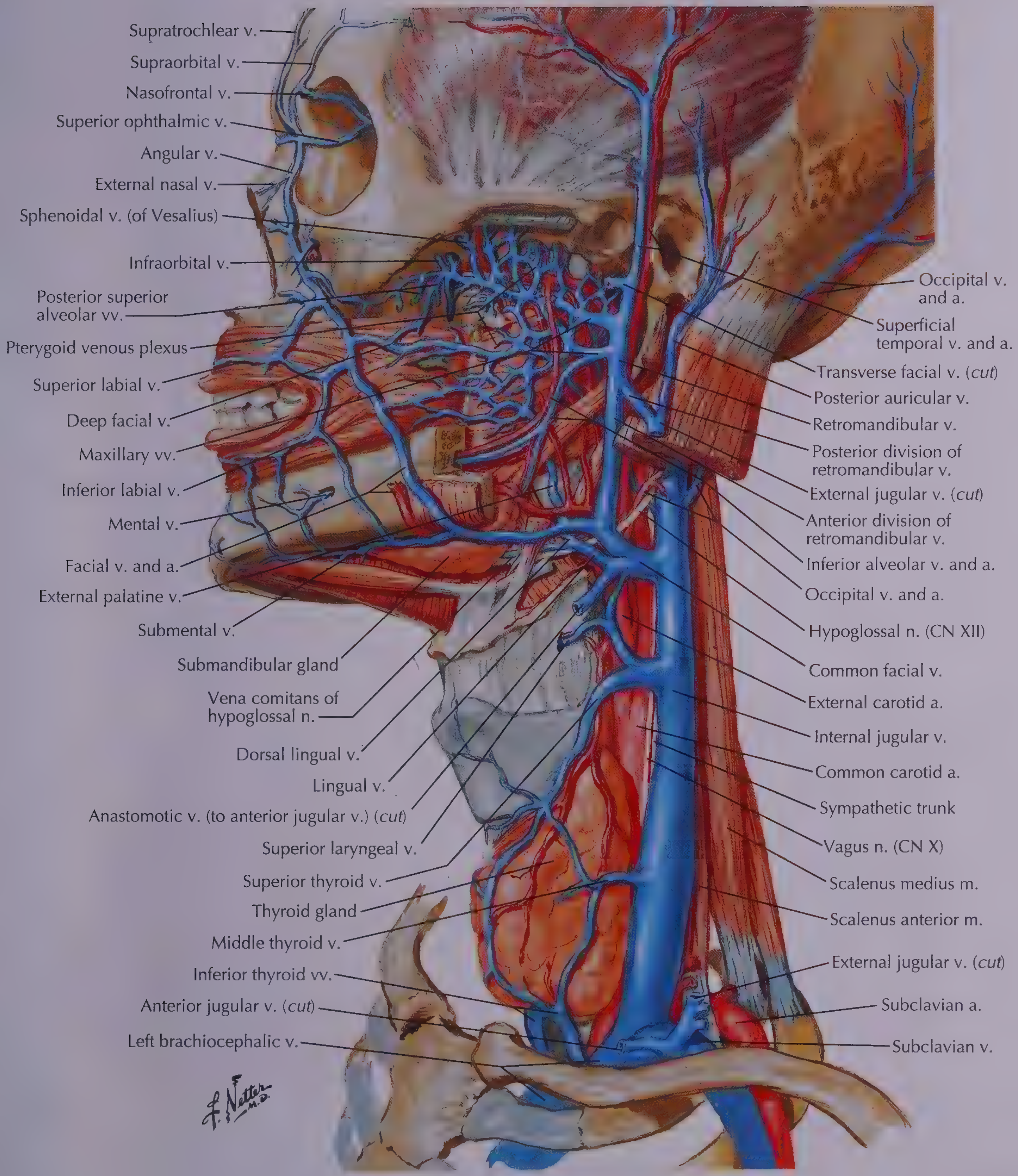

Zygomaticotemporal n.
Deep temporal nn.
Masseteric n.
Mandibular n. (CN V_3)
Nerve to medial pterygoid m. and Nerve to tensor veli palatini m. (*cut*)
Zygomaticofacial n.
Maxillary n. (CN V_2)
Infraorbital n.
Pterygopalatine ganglion
Lesser palatine nn.
Greater palatine n.
Anterior, middle, and posterior superior alveolar nn.
Nerve to lateral pterygoid m. (*cut*)
Buccal n.
Chorda tympani
Lingual n.
Medial pterygoid m. (*cut*) (lateral pterygoid m. removed)
Mental n.
Inferior alveolar n.
Nerve to mylohyoid m.
Submandibular ganglion
Glossopharyngeal n. (CN IX)
Hypoglossal n. (CN XII)
Thyrohyoid branch of hypoglossal n.
Internal branch of superior laryngeal n.
Carotid body
External branch of superior laryngeal n.
Ansa cervicalis
Superior root
Inferior root
Infrahyoid branches of ansa cervicalis
Sympathetic trunk
Recurrent laryngeal n.
Middle cervical ganglion
Common carotid a.
Vertebral a.
Auriculotemporal n.
Middle meningeal a.
Superficial temporal a. (*cut*)
Facial n. (CN VII) (*cut*)
Maxillary a.
Spinal accessory n. (CN XI) (*cut*)
Anterior ramus of C1 spinal n. (*cut*)
Anterior ramus of C2 spinal n. (*cut*)
Pharyngeal plexus
Carotid sinus n. (of Hering)
Internal carotid a.
External carotid a.
Vagus n. (CN X)
Anterior ramus of C4 spinal n. (*cut*)
Superior cervical cardiac branch of vagus n.
Phrenic n.
Ascending cervical a.
Scalenus medius m.
Scalenus anterior m.
Brachial plexus (*cut*)
Thyrocervical trunk
Subclavian a.

Arteries of Head and Neck

See also Plates 58, 74

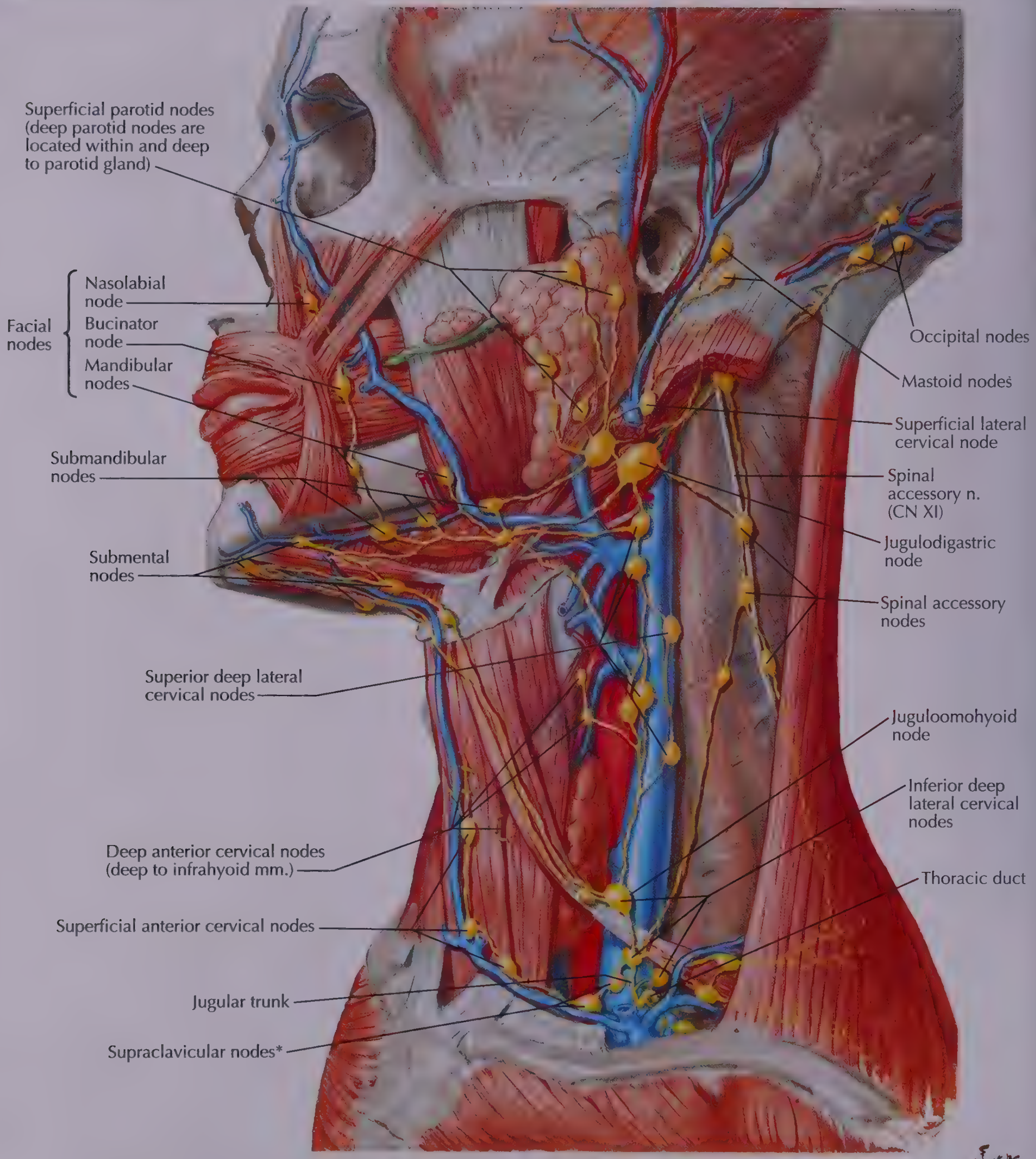

Supraorbital a.
Supratrochlear a.
Middle meningeal a.
Deep temporal aa.
Dorsal nasal a.
Masseteric a.
Angular a.
Infraorbital a.
Sphenopalatine a.
Descending palatine a.
Posterior superior alveolar a.
Superior labial a.
Buccal a.
Parotid duct (*cut*)
Bucinator
Inferior labial a.
Superior pharyngeal constrictor
Mental branch of inferior alveolar a.
Inferior alveolar a.
Facial a.
Submental a.
Mylohyoid branch of inferior alveolar a.
Submandibular gland
Hypoglossal n. (CN XII)
Suprahyoid branch of lingual a.
External carotid a.
Superior laryngeal a.
Superior thyroid a.
Cricothyroid branch of superior thyroid a.
Common carotid a.
Subclavian a.
Occipital a.
Auriculotemporal n.
Transverse facial a. (*cut*)
Superficial temporal a.
Deep auricular a.
Anterior tympanic a.
Maxillary a.
Posterior auricular a.
Ascending pharyngeal a.
Sternocleidomastoid branch of occipital a.
Occipital a.
Glossopharyngeal n. (CN IX)
Ascending palatine a.
Tonsillar branch of facial a.
Facial a.
Lingual a.
Ascending pharyngeal a.
Internal carotid a.
Vagus n. (CN X)
Superior cervical cardiac branch of vagus n.
Sympathetic trunk
Scalenus anterior m.
Phrenic n.
Scalenus medius m.
Ascending cervical a.
Thyrocervical trunk
F. Netter M.D.

See also Plate 101


Supratrochlear v.
Supraorbital v.
Nasofrontal v.
Superior ophthalmic v.
Angular v.
External nasal v.
Sphenoidal v. (of Vesalius)
Infraorbital v.
Posterior superior alveolar vv.
Pterygoid venous plexus
Superior labial v.
Deep facial v.
Maxillary vv.
Inferior labial v.
Mental v.
Facial v. and a.
External palatine v.
Submental v.
Submandibular gland
Vena comitans of hypoglossal n.
Dorsal lingual v.
Lingual v.
Anastomotic v. (to anterior jugular v.) (*cut*)
Superior laryngeal v.
Superior thyroid v.
Thyroid gland
Middle thyroid v.
Inferior thyroid vv.
Anterior jugular v. (*cut*)
Left brachiocephalic v.
Occipital v. and a.
Superficial temporal v. and a.
Transverse facial v. (*cut*)
Posterior auricular v.
Retromandibular v.
Posterior division of retromandibular v.
External jugular v. (*cut*)
Anterior division of retromandibular v.
Inferior alveolar v. and a.
Occipital v. and a.
Hypoglossal n. (CN XII)
Common facial v.
External carotid a.
Internal jugular v.
Common carotid a.
Sympathetic trunk
Vagus n. (CN X)
Scalenus medius m.
Scalenus anterior m.
External jugular v. (*cut*)
Subclavian a.
Subclavian v.
F. Netter M.D.

Lymph Nodes of Head and Neck

See also Plate 260


Superficial parotid nodes (deep parotid nodes are located within and deep to parotid gland)
Facial nodes
Nasolabial node
Bucinator node
Mandibular nodes
Submandibular nodes
Submental nodes
Superior deep lateral cervical nodes
Deep anterior cervical nodes (deep to infrahyoid mm.)
Superficial anterior cervical nodes
Jugular trunk
Supraclavicular nodes*
Occipital nodes
Mastoid nodes
Superficial lateral cervical node
Spinal accessory n. (CN XI)
Jugulodigastric node
Spinal accessory nodes
Juguloomohyoid node
Inferior deep lateral cervical nodes
Thoracic duct

**The supraclavicular group of nodes, especially on the left, are also sometimes referred to as the signal or sentinel lymph nodes of Virchow or Troisier, especially when sufficiently enlarged and palpable. These nodes (or a single node) are so termed because they may be the first recognized presumptive evidence of malignant disease in the viscera.*

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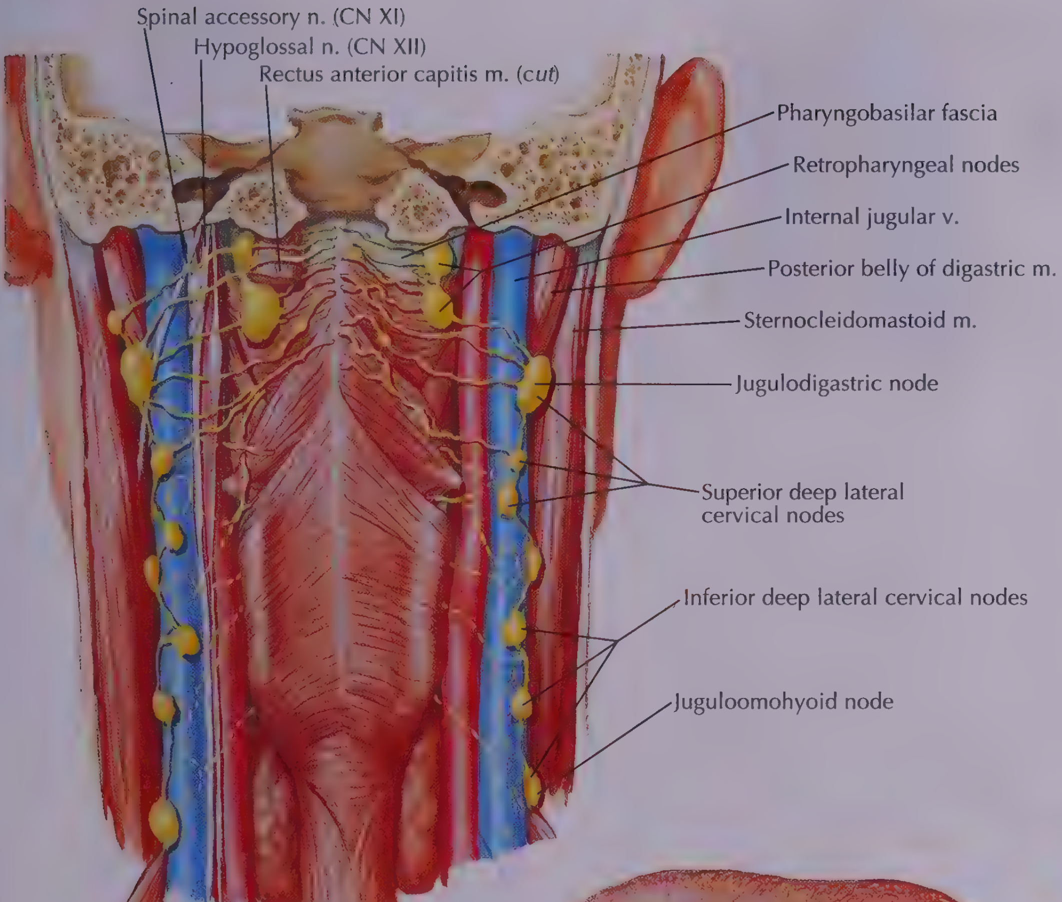
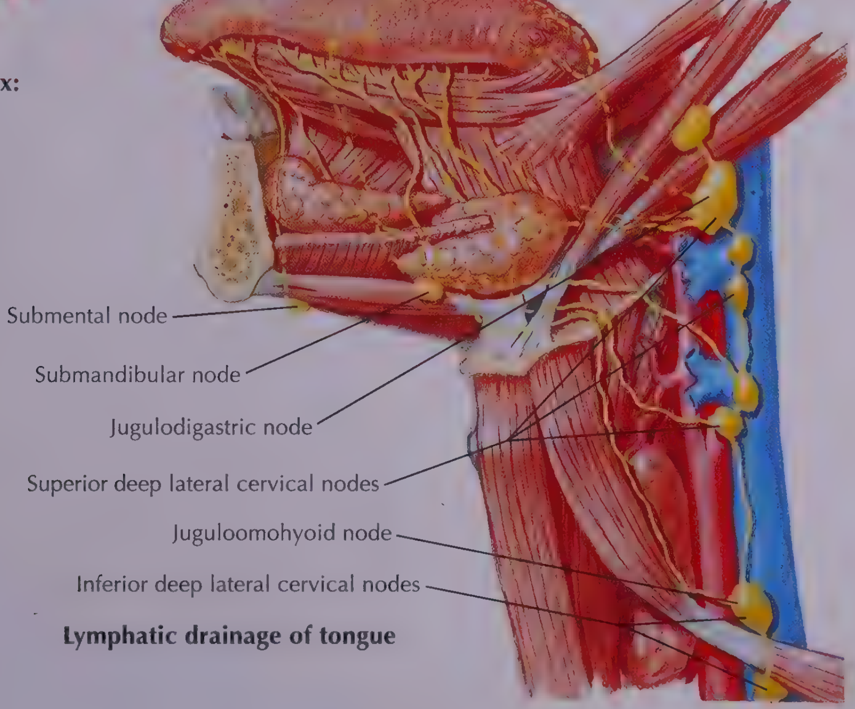

Spinal accessory n. (CN XI)
Hypoglossal n. (CN XII)
Rectus anterior capitis m. (*cut*)
Pharyngobasilar fascia
Retropharyngeal nodes
Internal jugular v.
Posterior belly of digastric m.
Sternocleidomastoid m.
Jugulodigastric node
Superior deep lateral cervical nodes
Inferior deep lateral cervical nodes
Juguloomohyoid node

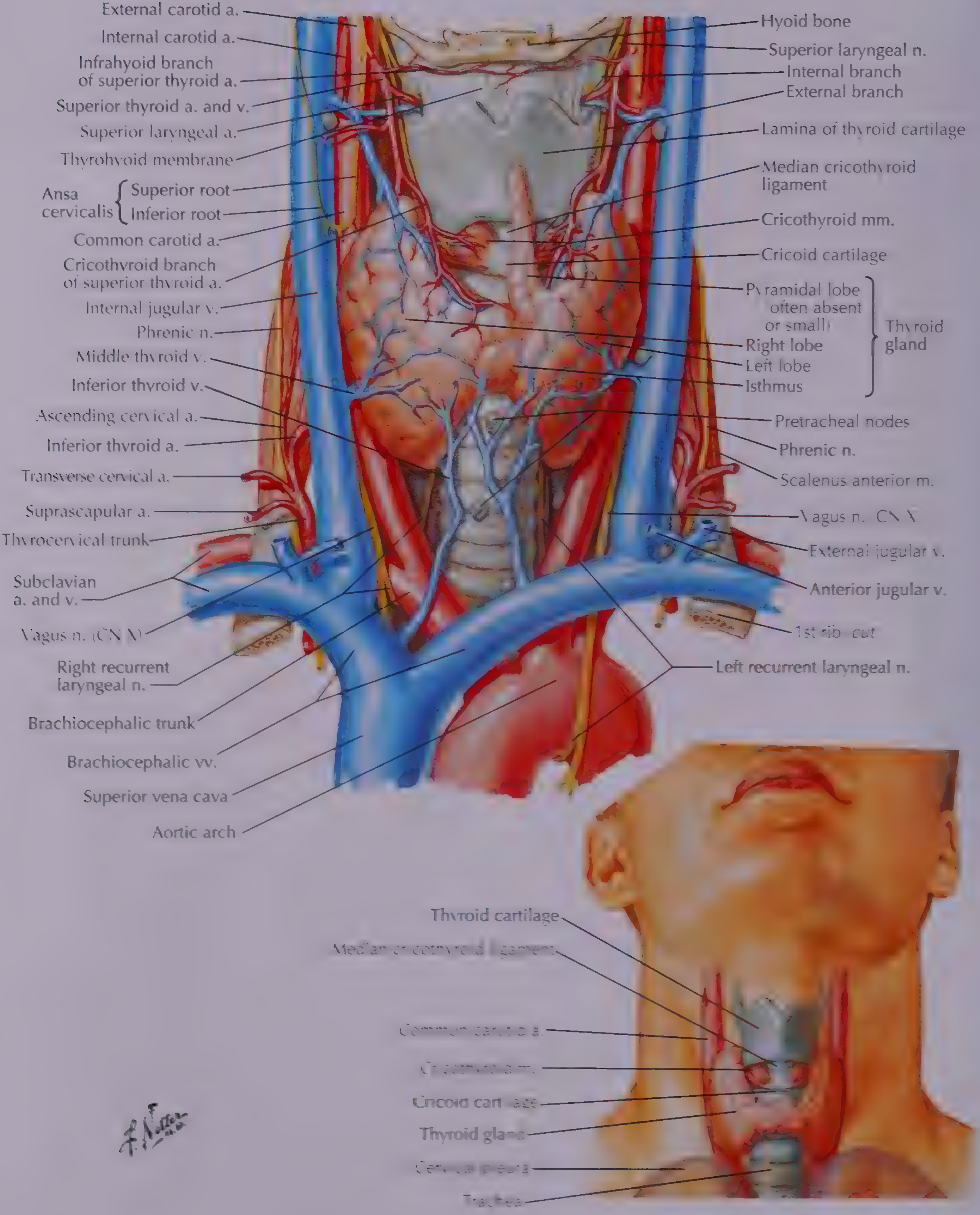
Lymphatic drainage of pharynx: posterior view


Submental node
Submandibular node
Jugulodigastric node
Superior deep lateral cervical nodes
Juguloomohyoid node
Inferior deep lateral cervical nodes

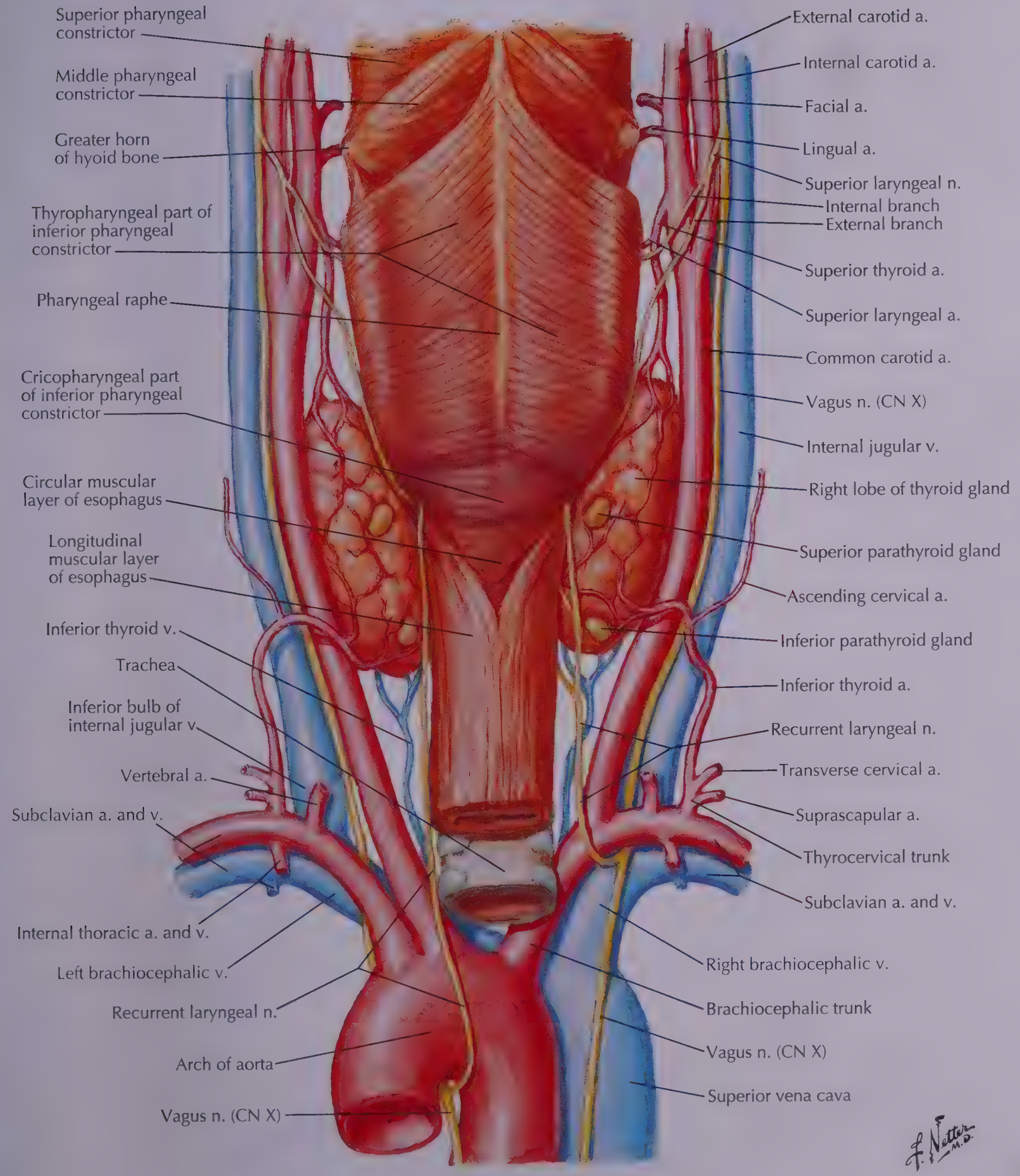
F. Netter M.D.

Lymphatic drainage of tongue

Thyroid Gland: Anterior View


External carotid a.
Internal carotid a.
Infrahyoid branch of superior thyroid a.
Superior thyroid a. and v.
Superior laryngeal a.
Thyrohyoid membrane
Ansa cervicalis
Superior root
Inferior root
Common carotid a.
Cricothyroid branch of superior thyroid a.
Internal jugular v.
Phrenic n.
Middle thyroid v.
Inferior thyroid v.
Ascending cervical a.
Inferior thyroid a.
Transverse cervical a.
Suprascapular a.
Thyrocervical trunk
Subclavian a. and v.
Vagus n. (CN X)
Right recurrent laryngeal n.
Brachiocephalic trunk
Brachiocephalic vv.
Superior vena cava
Aortic arch
Hyoid bone
Superior laryngeal n.
Internal branch
External branch
Lamina of thyroid cartilage
Median cricothyroid ligament
Cricothyroid mm.
Cricoid cartilage
Pyramidal lobe (often absent or small)
Right lobe
Left lobe
Isthmus
Thyroid gland
Pretracheal nodes
Phrenic n.
Scalenus anterior m.
Vagus n. (CN X)
External jugular v.
Anterior jugular v.
1st rib (cut)
Left recurrent laryngeal n.
Thyroid cartilage
Median cricothyroid ligament
Common carotid a.
Cricothyroid m.
Cricoid cartilage
Thyroid gland
Cervical pleura
Trachea

See also Plate 105


Superior pharyngeal constrictor
Middle pharyngeal constrictor
Greater horn of hyoid bone
Thyropharyngeal part of inferior pharyngeal constrictor
Pharyngeal raphe
Cricopharyngeal part of inferior pharyngeal constrictor
Circular muscular layer of esophagus
Longitudinal muscular layer of esophagus
Inferior thyroid v.
Trachea
Inferior bulb of internal jugular v.
Vertebral a.
Subclavian a. and v.
Internal thoracic a. and v.
Left brachiocephalic v.
Recurrent laryngeal n.
Arch of aorta
Vagus n. (CN X)
External carotid a.
Internal carotid a.
Facial a.
Lingual a.
Superior laryngeal n.
Internal branch
External branch
Superior thyroid a.
Superior laryngeal a.
Common carotid a.
Vagus n. (CN X)
Internal jugular v.
Right lobe of thyroid gland
Superior parathyroid gland
Ascending cervical a.
Inferior parathyroid gland
Inferior thyroid a.
Recurrent laryngeal n.
Transverse cervical a.
Suprascapular a.
Thyrocervical trunk
Subclavian a. and v.
Right brachiocephalic v.
Brachiocephalic trunk
Vagus n. (CN X)
Superior vena cava
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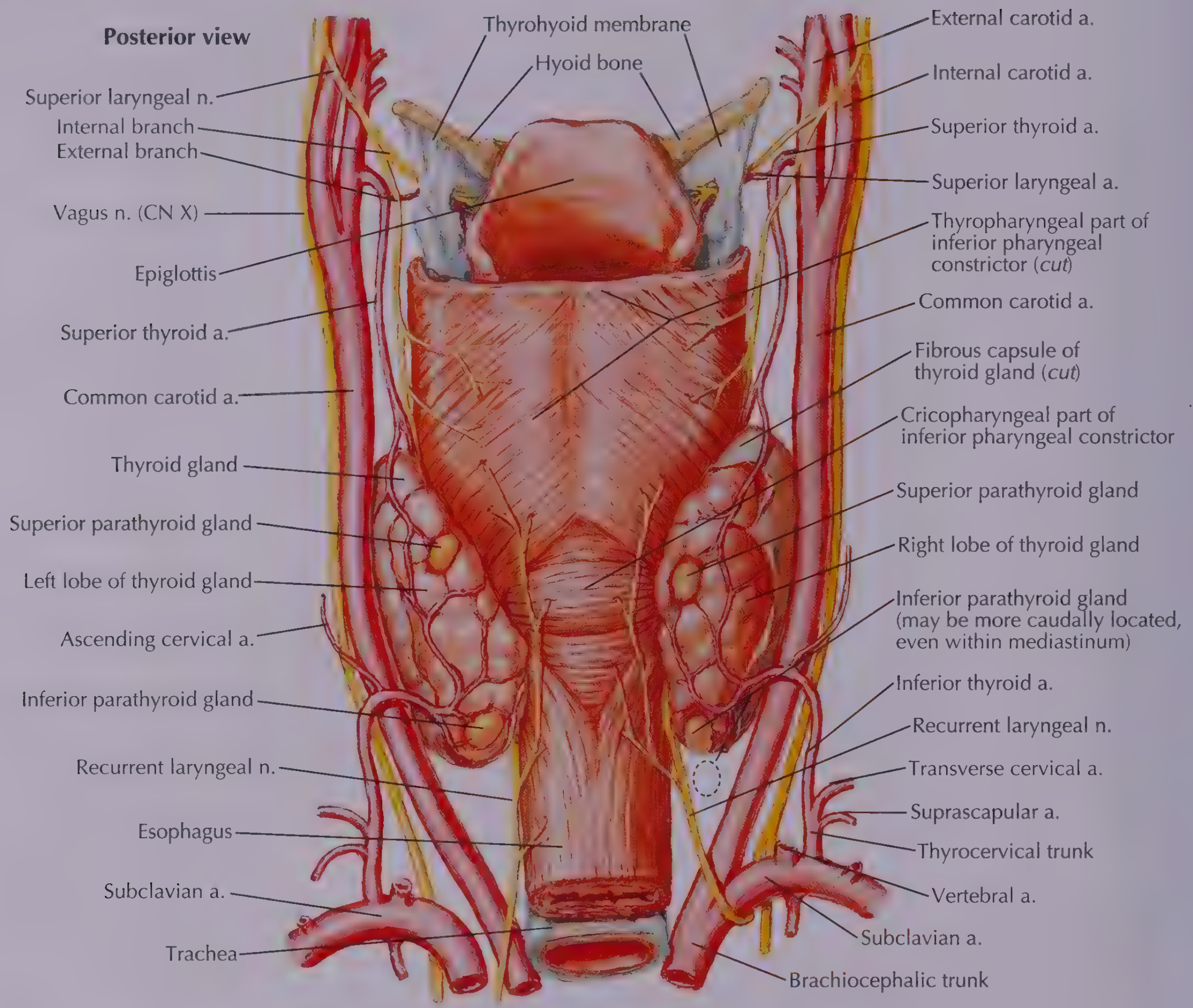
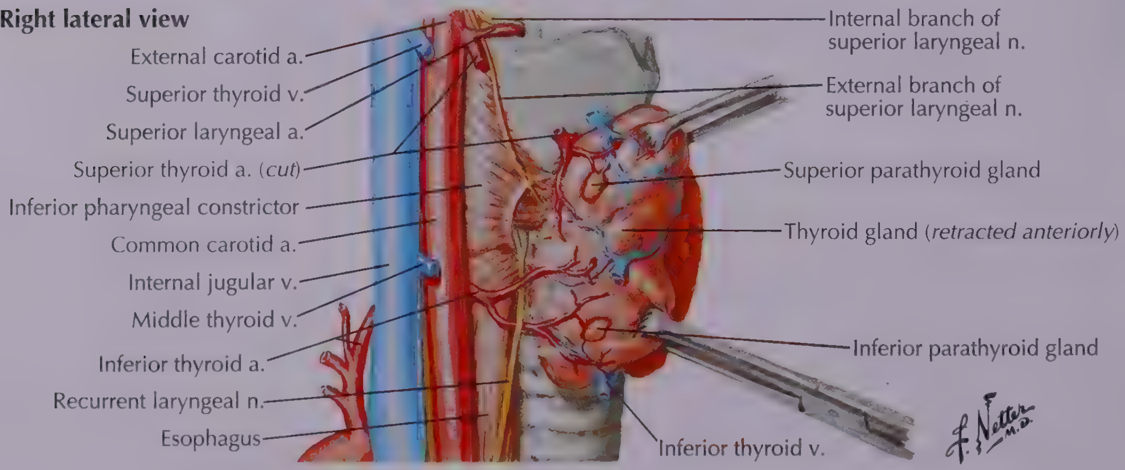
Thyroid and Parathyroid Glands

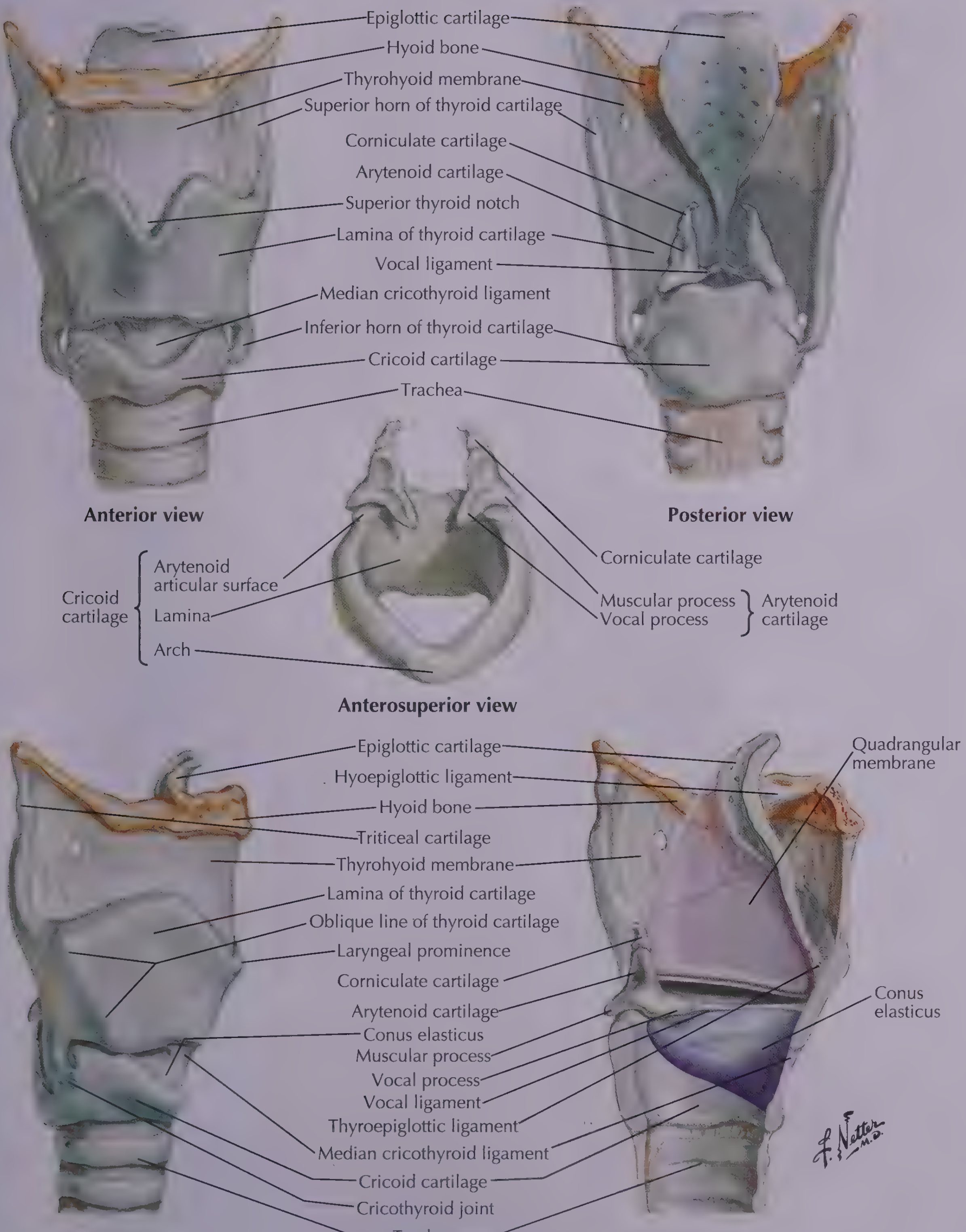
See also Plates 94, 104, 108


Posterior view
Thyrohyoid membrane
Hyoid bone
External carotid a.
Internal carotid a.
Superior thyroid a.
Superior laryngeal a.
Thyropharyngeal part of inferior pharyngeal constrictor (cut)
Common carotid a.
Fibrous capsule of thyroid gland (cut)
Cricopharyngeal part of inferior pharyngeal constrictor
Superior parathyroid gland
Right lobe of thyroid gland
Inferior parathyroid gland (may be more caudally located, even within mediastinum)
Inferior thyroid a.
Recurrent laryngeal n.
Transverse cervical a.
Suprascapular a.
Thyrocervical trunk
Vertebral a.
Subclavian a.
Brachiocephalic trunk
Superior laryngeal n.
Internal branch
External branch
Vagus n. (CN X)
Epiglottis
Superior thyroid a.
Common carotid a.
Thyroid gland
Superior parathyroid gland
Left lobe of thyroid gland
Ascending cervical a.
Inferior parathyroid gland
Recurrent laryngeal n.
Esophagus
Subclavian a.
Trachea


Right lateral view
External carotid a.
Superior thyroid v.
Superior laryngeal a.
Superior thyroid a. (cut)
Inferior pharyngeal constrictor
Common carotid a.
Internal jugular v.
Middle thyroid v.
Inferior thyroid a.
Recurrent laryngeal n.
Esophagus
Internal branch of superior laryngeal n.
External branch of superior laryngeal n.
Superior parathyroid gland
Thyroid gland (retracted anteriorly)
Inferior parathyroid gland
Inferior thyroid v.

Cartilages of Larynx

See also Plates 107, 108, 109


Epiglottic cartilage
Hyoid bone
Thyrohyoid membrane
Superior horn of thyroid cartilage
Corniculate cartilage
Arytenoid cartilage
Superior thyroid notch
Lamina of thyroid cartilage
Vocal ligament
Median cricothyroid ligament
Inferior horn of thyroid cartilage
Cricoid cartilage
Trachea
Cricoid cartilage
Arytenoid articular surface
Lamina
Arch
Corniculate cartilage
Muscular process
Vocal process
Arytenoid cartilage
Epiglottic cartilage
Hyoepiglottic ligament
Hyoid bone
Triticeal cartilage
Thyrohyoid membrane
Lamina of thyroid cartilage
Oblique line of thyroid cartilage
Laryngeal prominence
Corniculate cartilage
Arytenoid cartilage
Conus elasticus
Muscular process
Vocal process
Vocal ligament
Thyroepiglottic ligament
Median cricothyroid ligament
Cricoid cartilage
Cricothyroid joint
Trachea
Quadrangular membrane
Conus elasticus

Anterior view

Posterior view

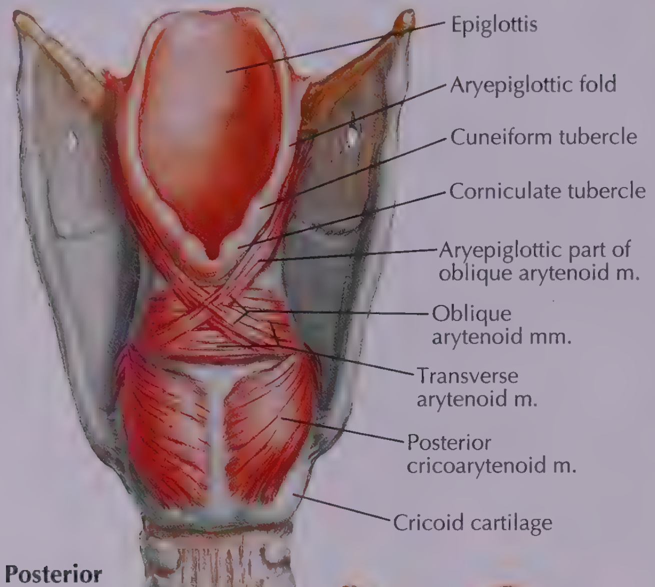
Anterosuperior view

Right lateral view

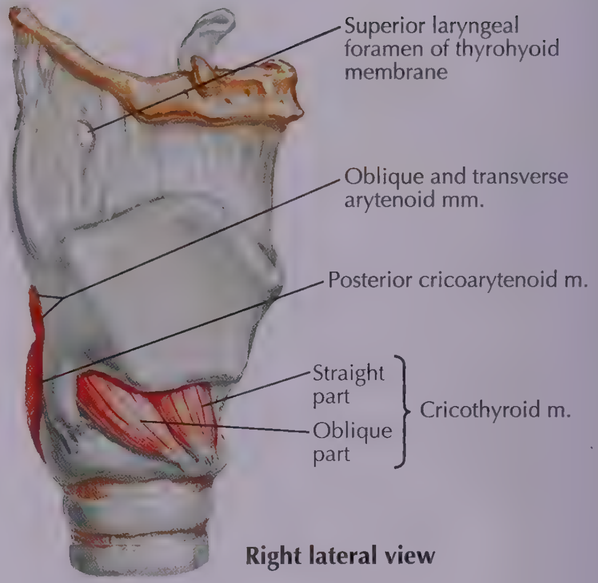
Median section

Intrinsic Muscles of Larynx

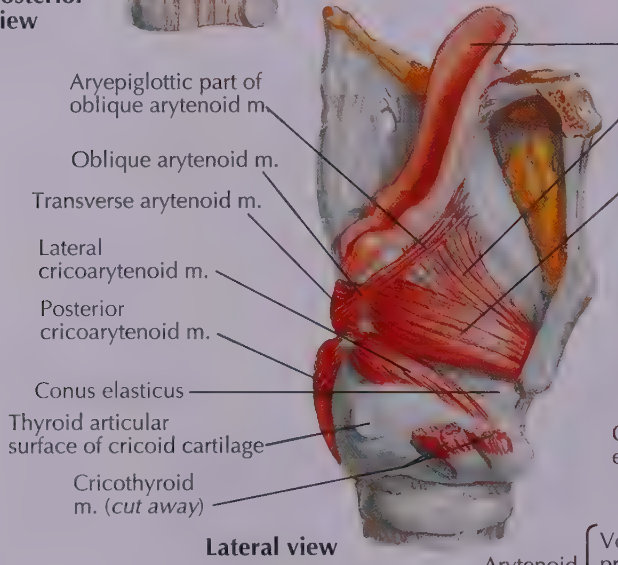
See also Plates 94, 106, 108, 109


Epiglottis
Aryepiglottic fold
Cuneiform tubercle
Corniculate tubercle
Aryepiglottic part of oblique arytenoid m.
Oblique arytenoid mm.
Transverse arytenoid m.
Posterior cricoarytenoid m.
Cricoid cartilage

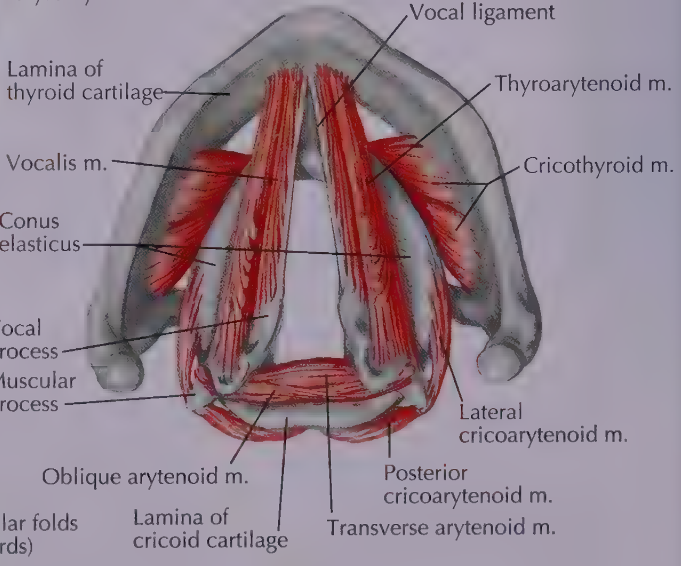
Posterior view


Superior laryngeal foramen of thyrohyoid membrane
Oblique and transverse arytenoid mm.
Posterior cricoarytenoid m.
Straight part
Oblique part
Cricothyroid m.

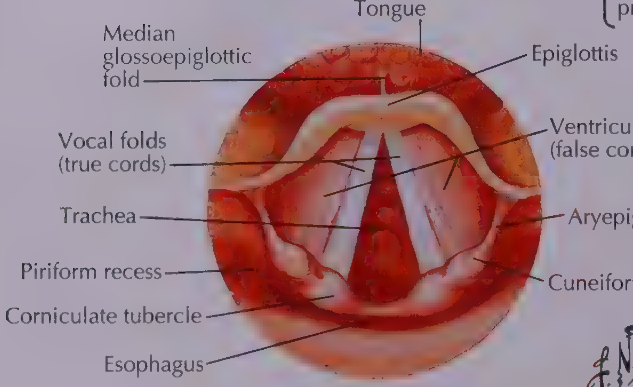
Right lateral view


Epiglottis
Aryepiglottic part of oblique arytenoid m.
Thyroepiglottic part of thyroarytenoid m.
Oblique arytenoid m.
External part of thyroarytenoid m.
Transverse arytenoid m.
Lateral cricoarytenoid m.
Posterior cricoarytenoid m.
Conus elasticus
Thyroid articular surface of cricoid cartilage
Cricothyroid m. (*cut away*)

Lateral view


Vocal ligament
Lamina of thyroid cartilage
Thyroarytenoid m.
Vocalis m.
Cricothyroid m.
Conus elasticus
Arytenoid cartilage
Vocal process
Muscular process
Lateral cricoarytenoid m.
Oblique arytenoid m.
Posterior cricoarytenoid m.
Lamina of cricoid cartilage
Transverse arytenoid m.

Superior view


Tongue
Median glossoepiglottic fold
Epiglottis
Vocal folds (true cords)
Ventricular folds (false cords)
Trachea
Aryepiglottic fold
Piriform recess
Cuneiform tubercle
Corniculate tubercle
Esophagus

Laryngoscopic view: inspiration

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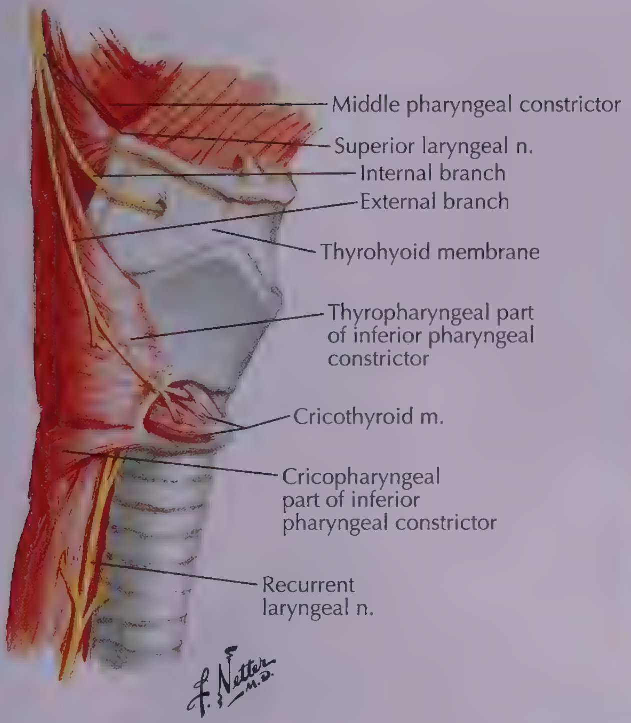
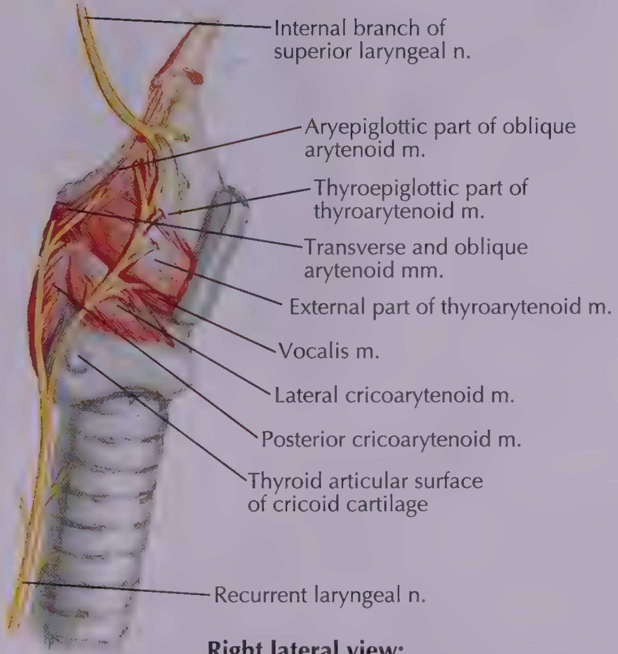
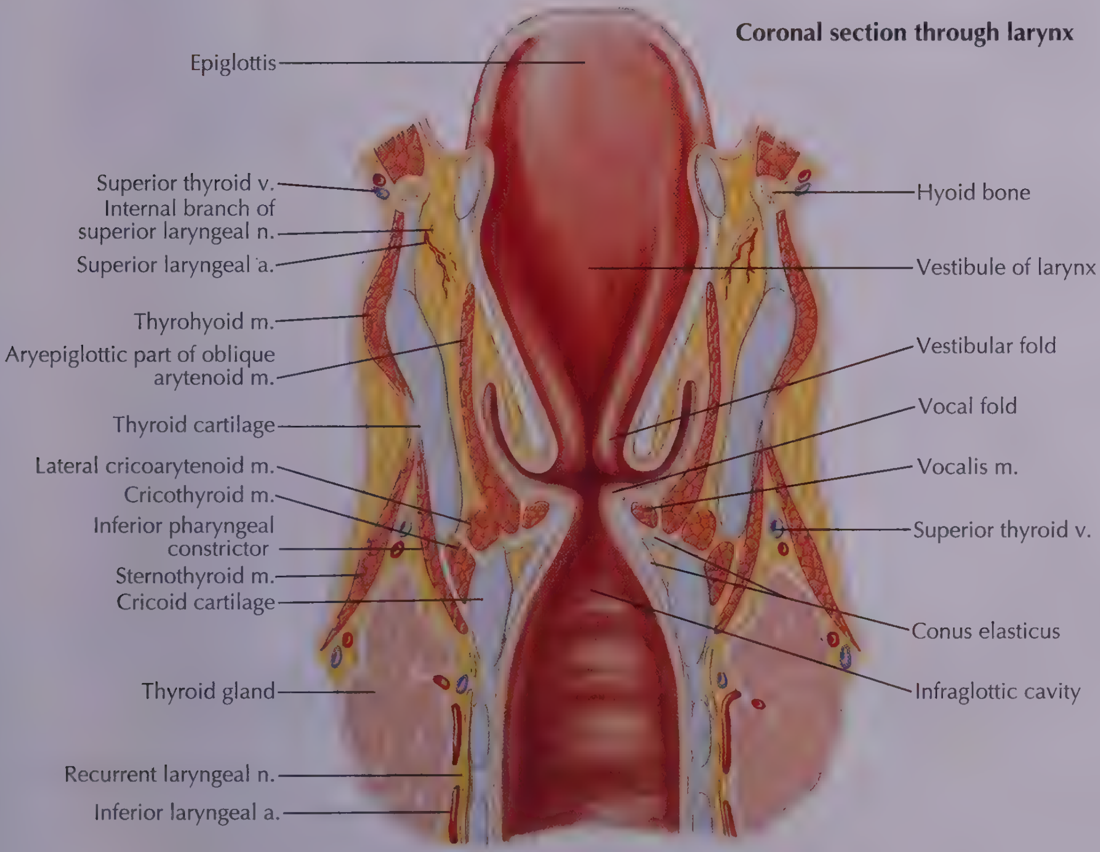
See also Plates 103, 106, 107, 109


Middle pharyngeal constrictor
Superior laryngeal n.
Internal branch
External branch
Thyrohyoid membrane
Thyropharyngeal part of inferior pharyngeal constrictor
Cricothyroid m.
Cricopharyngeal part of inferior pharyngeal constrictor
Recurrent laryngeal n.
F. Netter M.D.


Internal branch of superior laryngeal n.
Aryepiglottic part of oblique arytenoid m.
Thyroepiglottic part of thyroarytenoid m.
Transverse and oblique arytenoid mm.
External part of thyroarytenoid m.
Vocalis m.
Lateral cricoarytenoid m.
Posterior cricoarytenoid m.
Thyroid articular surface of cricoid cartilage
Recurrent laryngeal n.

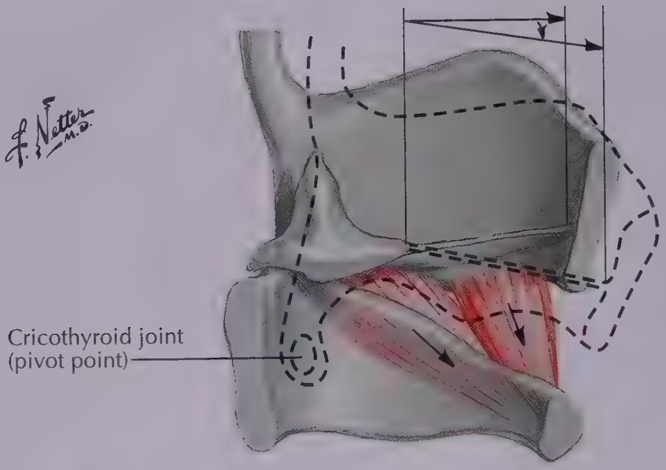
Right lateral view: thyroid cartilage partially removed


Coronal section through larynx

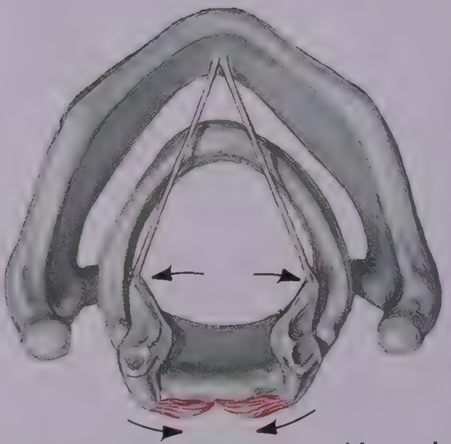
Epiglottis
Superior thyroid v.
Internal branch of superior laryngeal n.
Superior laryngeal a.
Thyrohyoid m.
Aryepiglottic part of oblique arytenoid m.
Thyroid cartilage
Lateral cricoarytenoid m.
Cricothyroid m.
Inferior pharyngeal constrictor
Sternothyroid m.
Cricoid cartilage
Thyroid gland
Recurrent laryngeal n.
Inferior laryngeal a.
Hyoid bone
Vestibule of larynx
Vestibular fold
Vocal fold
Vocalis m.
Superior thyroid v.
Conus elasticus
Infraglottic cavity

Action of Intrinsic Muscles of Larynx

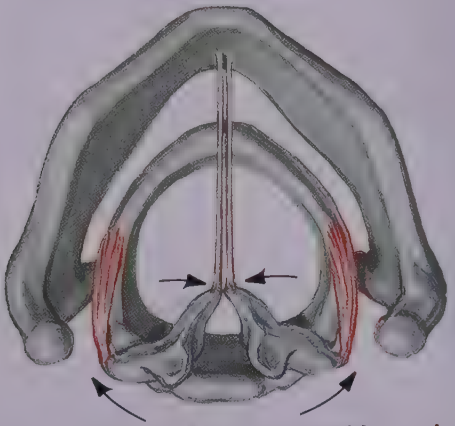
See also Plates 106, 107, 108



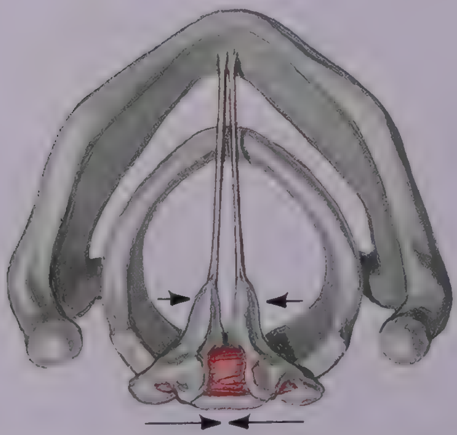
Action of cricothyroid muscles
Stretching of vocal ligaments



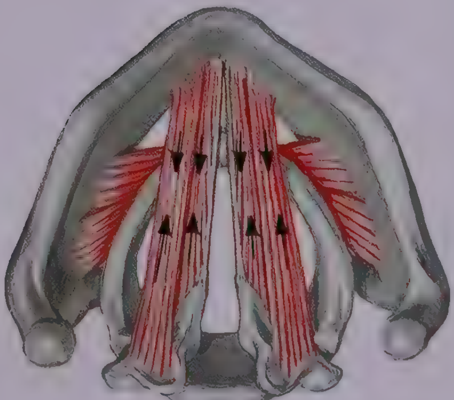
Action of posterior cricoarytenoid muscles
Abduction of vocal ligaments



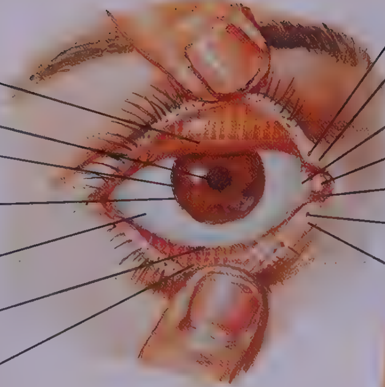
Action of lateral cricoarytenoid muscles
Adduction of vocal ligaments

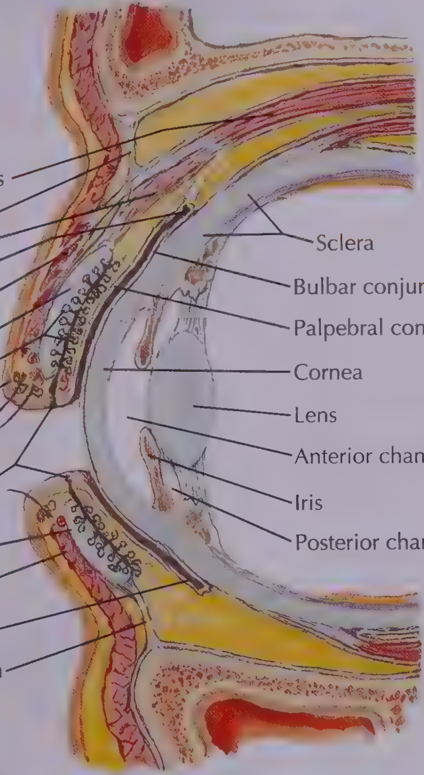


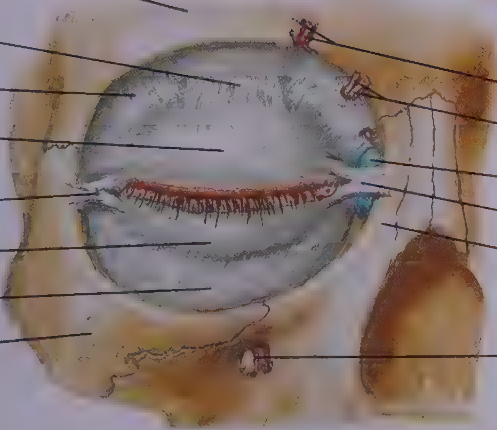
Action of transverse and oblique arytenoid muscles
Adduction of vocal ligaments



Action of vocalis and thyroarytenoid muscles
Shortening (relaxation) of vocal ligaments

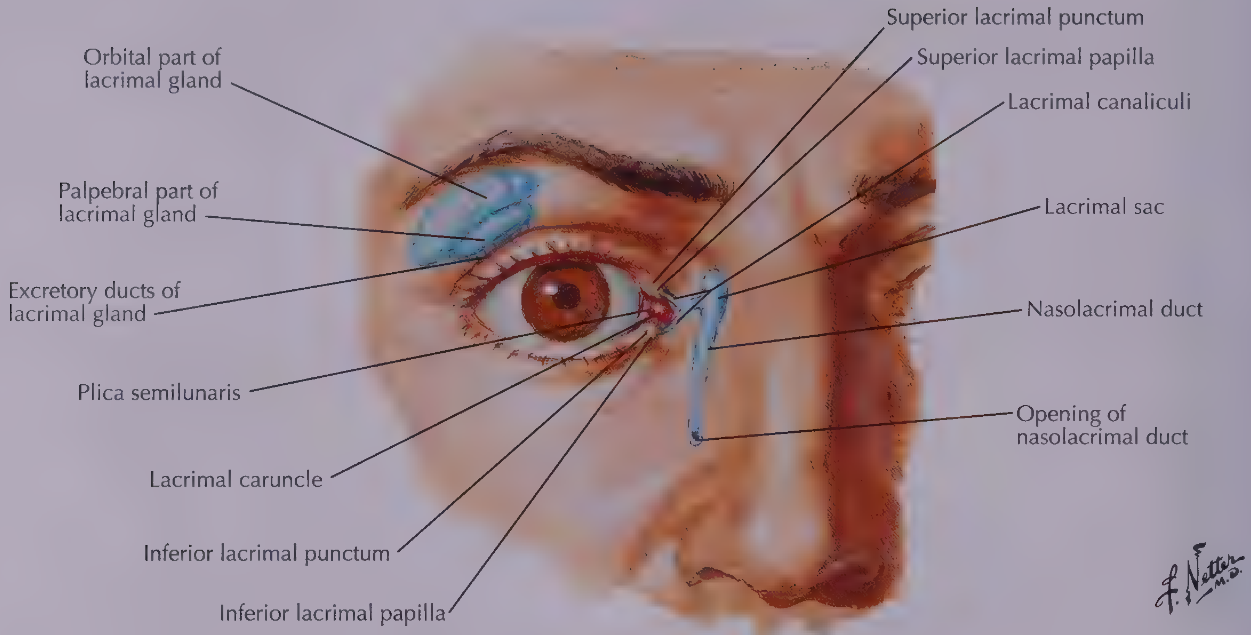

Superior palpebral conjunctiva
Seen through cornea
Pupil
Iris
Corneoscleral junction (corneal limbus)
Sclera (covered by bulbar conjunctiva)
Inferior conjunctival fornix
Inferior palpebral conjunctiva
Superior lacrimal punctum
Superior lacrimal papilla
Plica semilunaris
Lacrimal caruncle
Lacus lacrimalis
Inferior lacrimal punctum
Inferior lacrimal papilla

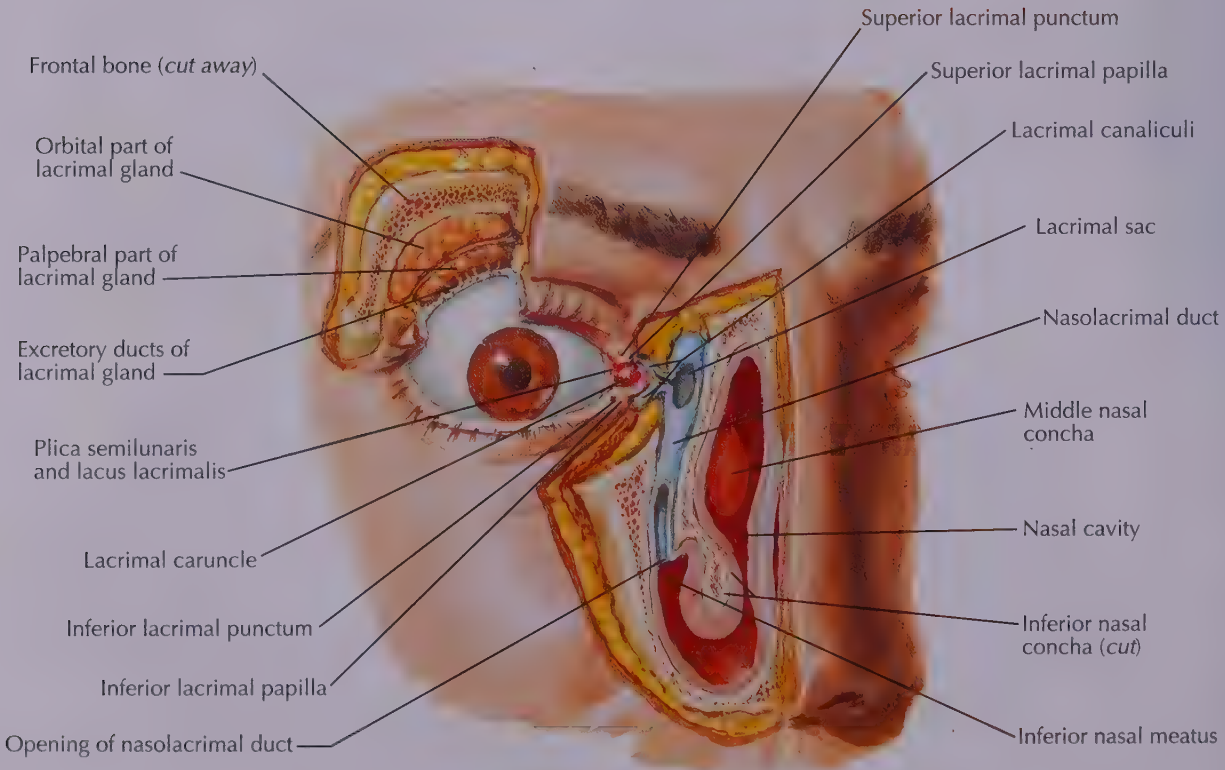

Levator palpebrae superioris
Orbital septum
Superior tarsal m.
Superior conjunctival fornix
Palpebral part of orbicularis oculi m.
Superior tarsus
Tarsal glands (Meibomian glands)
Sebaceous glands
Eyelashes
Openings of tarsal glands
Inferior tarsus
Palpebral part of orbicularis oculi m.
Inferior conjunctival fornix
Orbital septum
Sclera
Bulbar conjunctiva
Palpebral conjunctiva
Cornea
Lens
Anterior chamber
Iris
Posterior chamber
F. Netter M.D.


Frontal bone
Attachment of levator palpebrae superioris
Orbital septum
Superior tarsus
Lateral palpebral ligament
Inferior tarsus
Orbital septum
Zygomatic bone
Supraorbital a. and n.
Supratrochlear a. and n.
Lacrimal sac
Medial palpebral ligament
Frontal process of maxilla
Infraorbital a. and n.

Lacrimal Apparatus

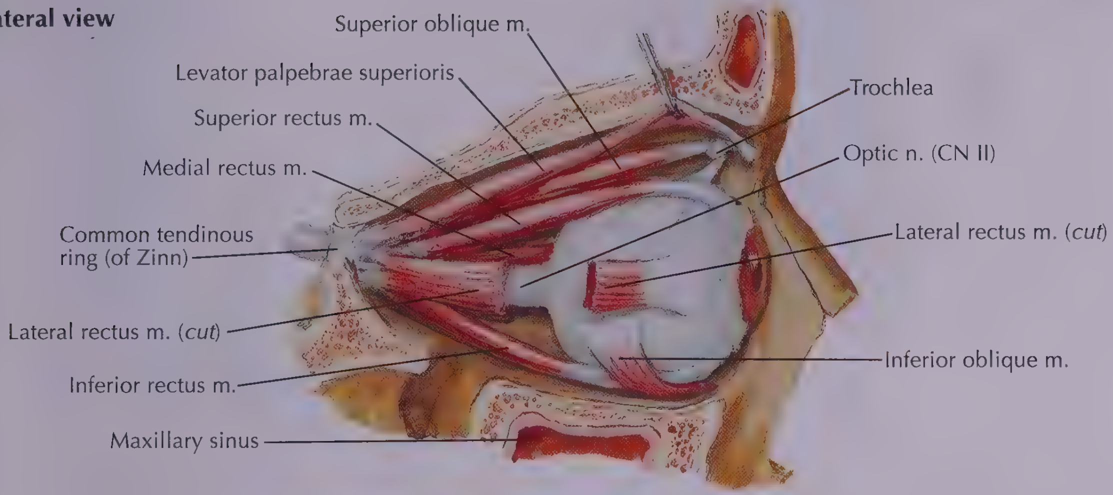
See also Plates 61, 160


Orbital part of lacrimal gland
Palpebral part of lacrimal gland
Excretory ducts of lacrimal gland
Plica semilunaris
Lacrimal caruncle
Inferior lacrimal punctum
Inferior lacrimal papilla
Superior lacrimal punctum
Superior lacrimal papilla
Lacrimal canaliculi
Lacrimal sac
Nasolacrimal duct
Opening of nasolacrimal duct
F. Netter M.D.

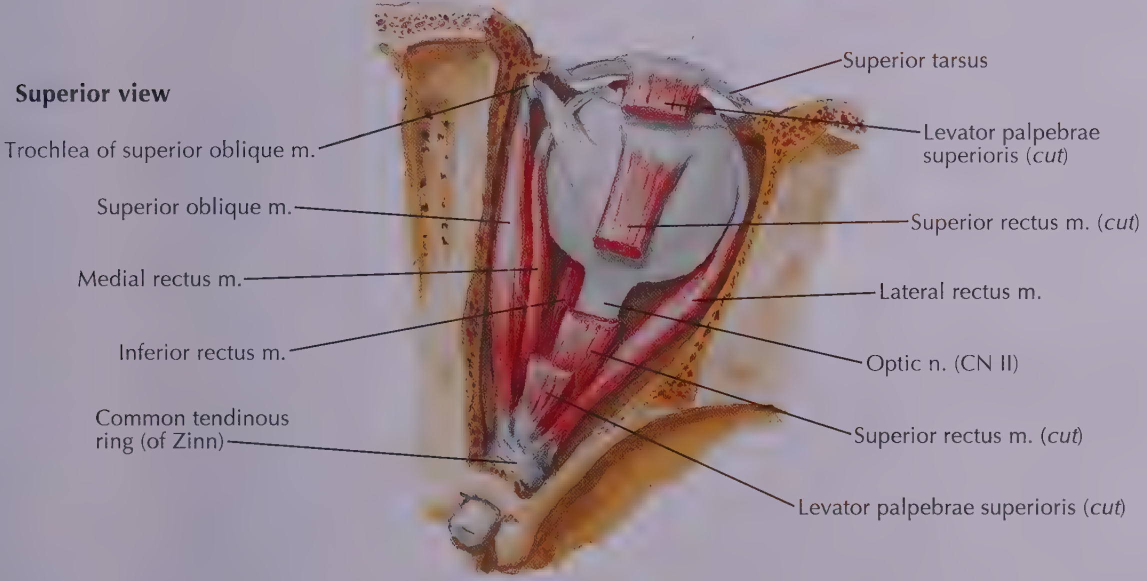

Frontal bone (*cut away*)
Orbital part of lacrimal gland
Palpebral part of lacrimal gland
Excretory ducts of lacrimal gland
Plica semilunaris and lacus lacrimalis
Lacrimal caruncle
Inferior lacrimal punctum
Inferior lacrimal papilla
Opening of nasolacrimal duct
Superior lacrimal punctum
Superior lacrimal papilla
Lacrimal canaliculi
Lacrimal sac
Nasolacrimal duct
Middle nasal concha
Nasal cavity
Inferior nasal concha (*cut*)
Inferior nasal meatus

See also Plates 113, BP 27

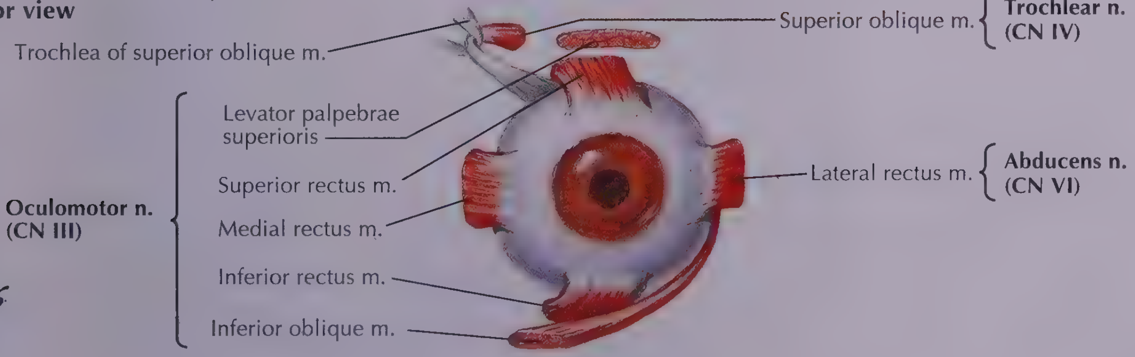
Right lateral view


Superior oblique m.
Levator palpebrae superioris
Superior rectus m.
Medial rectus m.
Common tendinous ring (of Zinn)
Lateral rectus m. (*cut*)
Inferior rectus m.
Maxillary sinus
Trochlea
Optic n. (CN II)
Lateral rectus m. (*cut*)
Inferior oblique m.

Superior view


Trochlea of superior oblique m.
Superior oblique m.
Medial rectus m.
Inferior rectus m.
Common tendinous ring (of Zinn)
Superior tarsus
Levator palpebrae superioris (*cut*)
Superior rectus m. (*cut*)
Lateral rectus m.
Optic n. (CN II)
Superior rectus m. (*cut*)
Levator palpebrae superioris (*cut*)

Innervation of extrinsic eye muscles: anterior view


Trochlea of superior oblique m.
Superior oblique m.
Trochlear n. (CN IV)
Oculomotor n. (CN III)
Levator palpebrae superioris
Superior rectus m.
Medial rectus m.
Inferior rectus m.
Inferior oblique m.
Lateral rectus m.
Abducens n. (CN VI)

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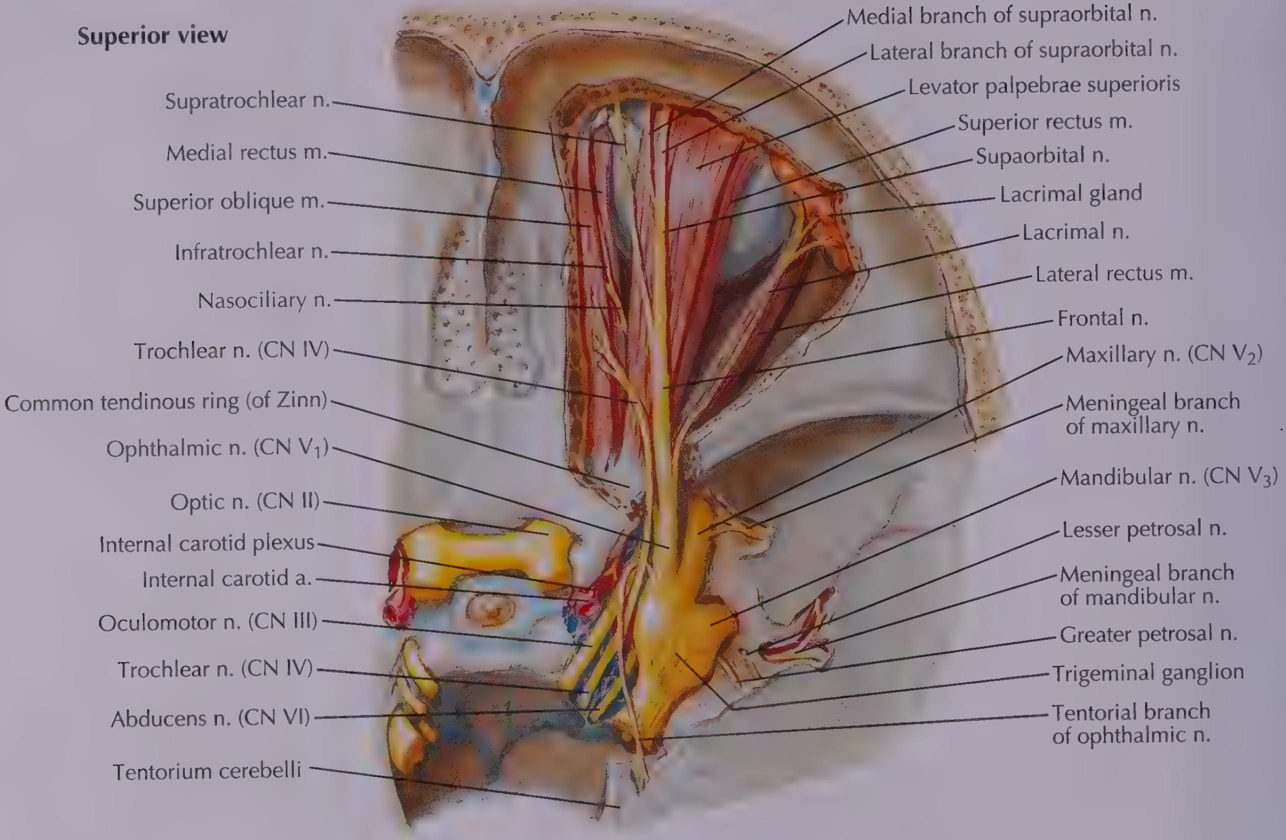
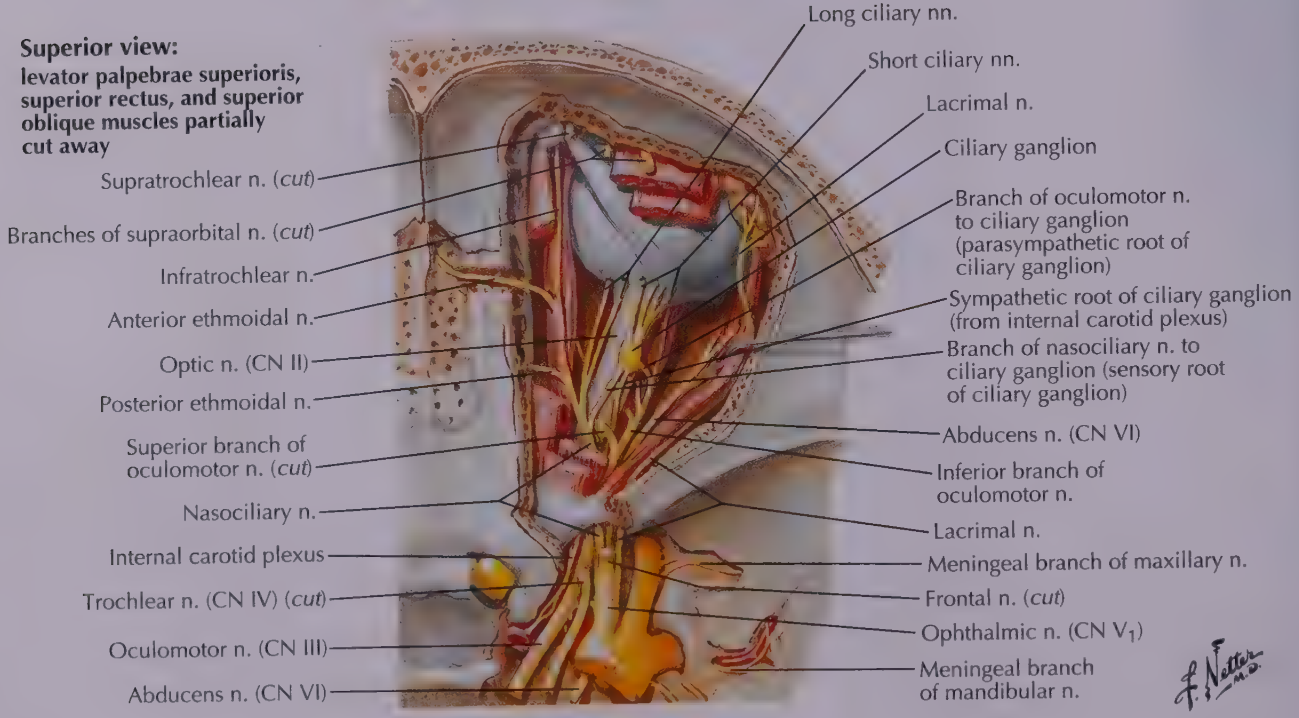
Nerves of Orbit

See also Plates 79, 148, 149, BP 27

Superior view


Supratrochlear n.
Medial rectus m.
Superior oblique m.
Infratrochlear n.
Nasociliary n.
Trochlear n. (CN IV)
Common tendinous ring (of Zinn)
Ophthalmic n. (CN V_1)
Optic n. (CN II)
Internal carotid plexus
Internal carotid a.
Oculomotor n. (CN III)
Trochlear n. (CN IV)
Abducens n. (CN VI)
Tentorium cerebelli
Medial branch of supraorbital n.
Lateral branch of supraorbital n.
Levator palpebrae superioris
Superior rectus m.
Supaorbital n.
Lacrimal gland
Lacrimal n.
Lateral rectus m.
Frontal n.
Maxillary n. (CN V_2)
Meningeal branch of maxillary n.
Mandibular n. (CN V_3)
Lesser petrosal n.
Meningeal branch of mandibular n.
Greater petrosal n.
Trigeminal ganglion
Tentorial branch of ophthalmic n.

Superior view:
levator palpebrae superioris, superior rectus, and superior oblique muscles partially cut away


Supratrochlear n. (*cut*)
Branches of supraorbital n. (*cut*)
Infratrochlear n.
Anterior ethmoidal n.
Optic n. (CN II)
Posterior ethmoidal n.
Superior branch of oculomotor n. (*cut*)
Nasociliary n.
Internal carotid plexus
Trochlear n. (CN IV) (*cut*)
Oculomotor n. (CN III)
Abducens n. (CN VI)
Long ciliary nn.
Short ciliary nn.
Lacrimal n.
Ciliary ganglion
Branch of oculomotor n. to ciliary ganglion (parasympathetic root of ciliary ganglion)
Sympathetic root of ciliary ganglion (from internal carotid plexus)
Branch of nasociliary n. to ciliary ganglion (sensory root of ciliary ganglion)
Abducens n. (CN VI)
Inferior branch of oculomotor n.
Lacrimal n.
Meningeal branch of maxillary n.
Frontal n. (*cut*)
Ophthalmic n. (CN V_1)
Meningeal branch of mandibular n.
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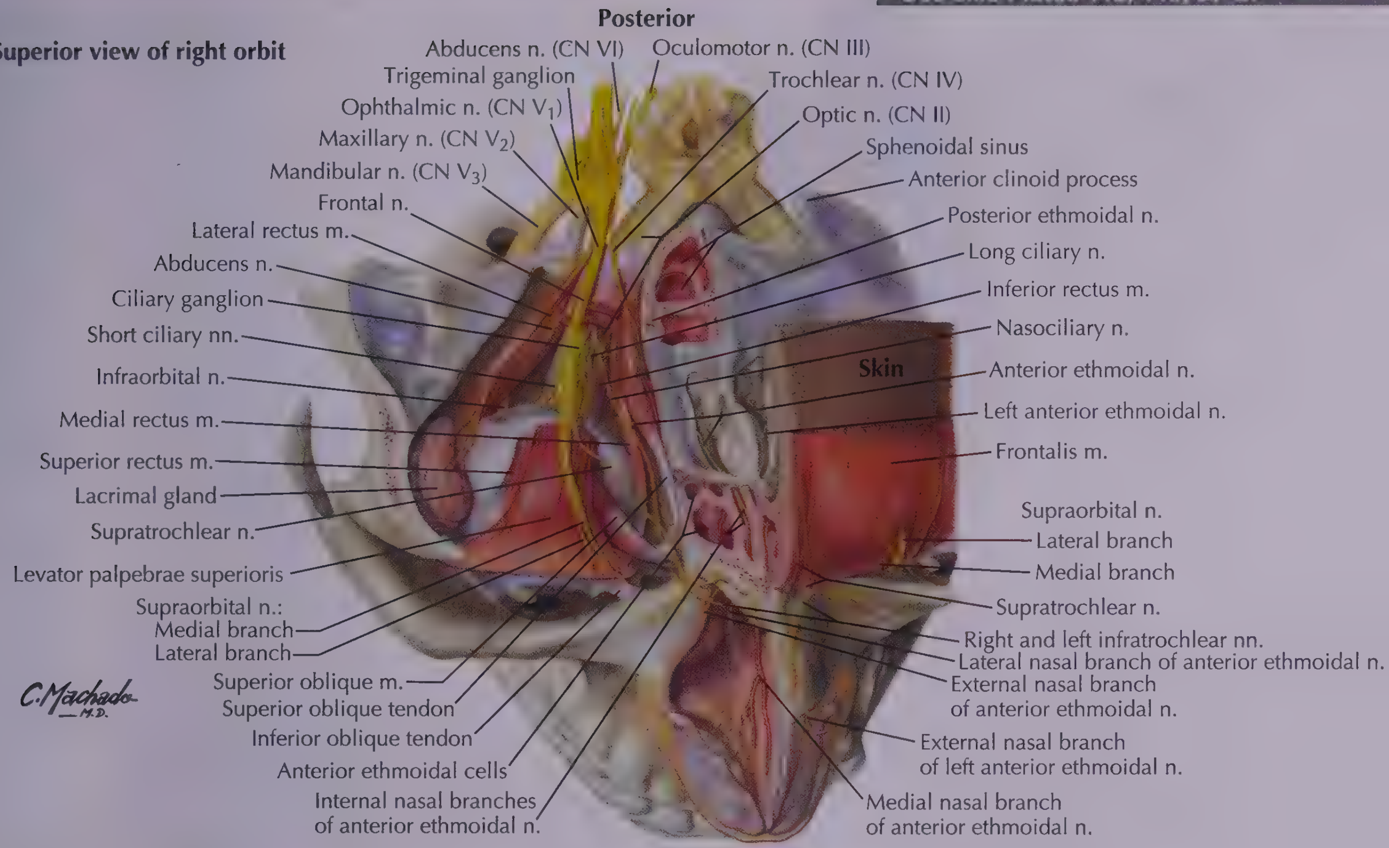
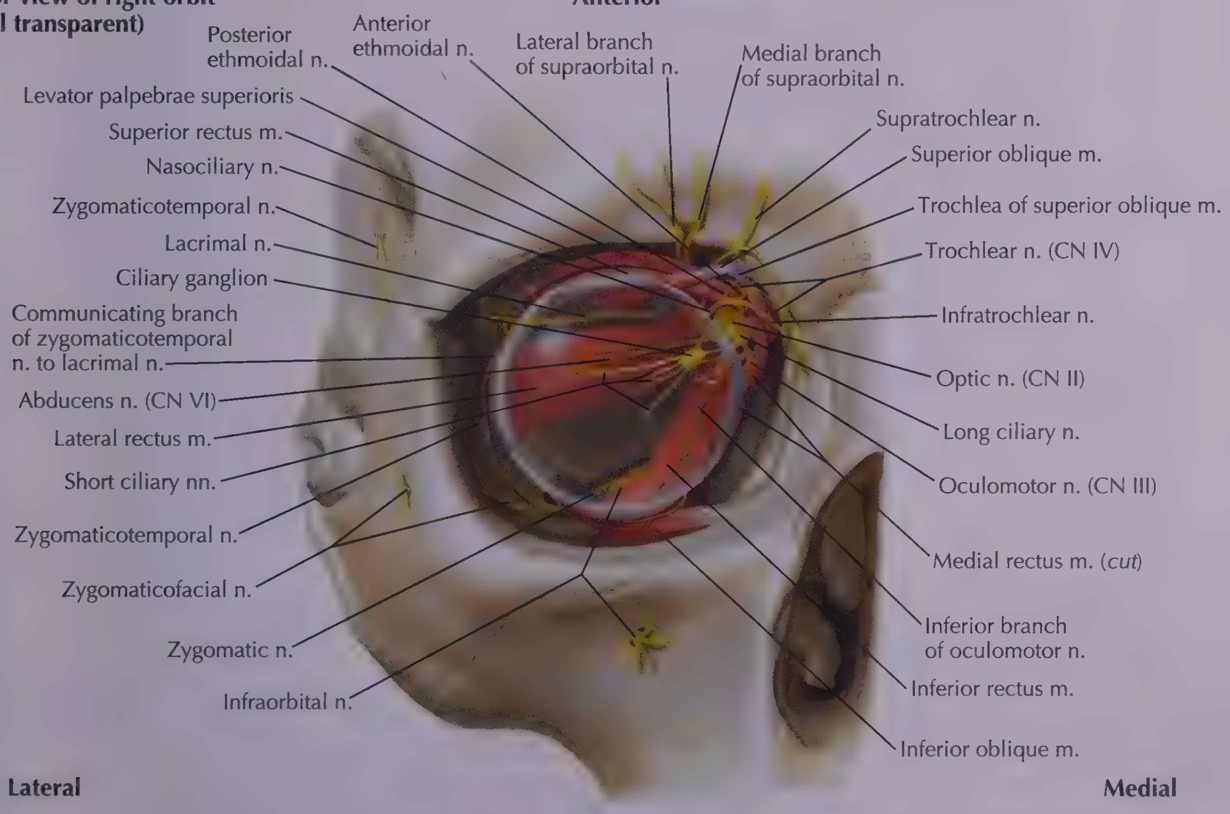
See also Plates 112, 113, BP 27

Superior view of right orbit

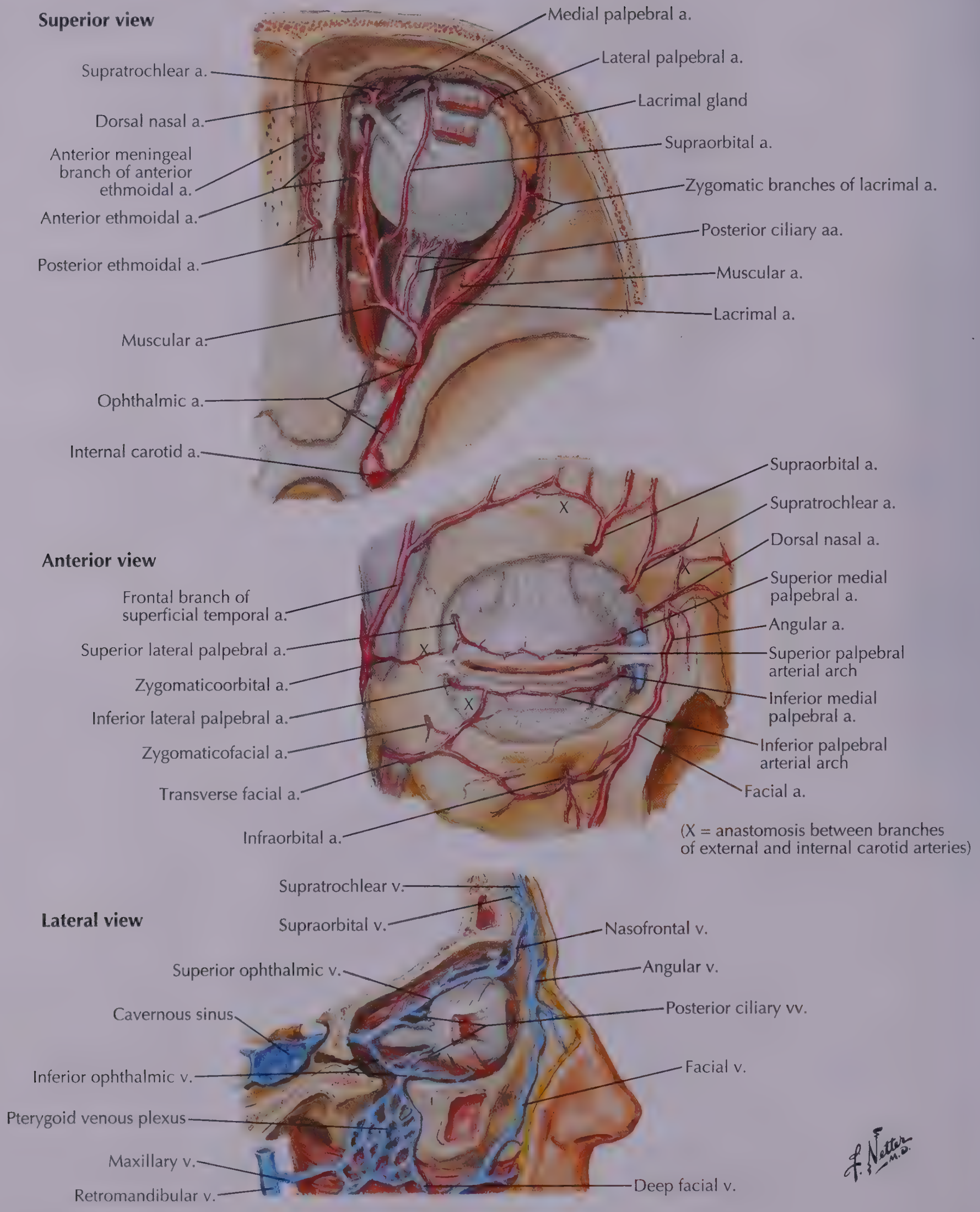

Posterior
Abducens n. (CN VI)
Oculomotor n. (CN III)
Trigeminal ganglion
Trochlear n. (CN IV)
Ophthalmic n. (CN V_1)
Optic n. (CN II)
Maxillary n. (CN V_2)
Sphenoidal sinus
Mandibular n. (CN V_3)
Anterior clinoid process
Frontal n.
Posterior ethmoidal n.
Lateral rectus m.
Long ciliary n.
Abducens n.
Inferior rectus m.
Ciliary ganglion
Nasociliary n.
Short ciliary nn.
Skin
Anterior ethmoidal n.
Infraorbital n.
Left anterior ethmoidal n.
Medial rectus m.
Frontalis m.
Superior rectus m.
Lacrimal gland
Supraorbital n.
Lateral branch
Supratrochlear n.
Medial branch
Levator palpebrae superioris
Supratrochlear n.
Supraorbital n.:
Medial branch
Right and left infratrochlear nn.
Lateral branch
Lateral nasal branch of anterior ethmoidal n.
Superior oblique m.
External nasal branch of anterior ethmoidal n.
C. Machado M.D.
Superior oblique tendon
Inferior oblique tendon
External nasal branch of left anterior ethmoidal n.
Anterior ethmoidal cells
Internal nasal branches of anterior ethmoidal n.
Medial nasal branch of anterior ethmoidal n.

Anterior view of right orbit (eyeball transparent)


Anterior
Posterior ethmoidal n.
Anterior ethmoidal n.
Lateral branch of supraorbital n.
Medial branch of supraorbital n.
Levator palpebrae superioris
Supratrochlear n.
Superior rectus m.
Superior oblique m.
Nasociliary n.
Zygomaticotemporal n.
Trochlea of superior oblique m.
Lacrimal n.
Trochlear n. (CN IV)
Ciliary ganglion
Infratrochlear n.
Communicating branch of zygomaticotemporal n. to lacrimal n.
Optic n. (CN II)
Abducens n. (CN VI)
Long ciliary n.
Lateral rectus m.
Oculomotor n. (CN III)
Short ciliary nn.
Zygomaticotemporal n.
Medial rectus m. (*cut*)
Zygomaticofacial n.
Inferior branch of oculomotor n.
Zygomatic n.
Inferior rectus m.
Infraorbital n.
Inferior oblique m.
Lateral
Medial

Arteries and Veins of Orbit and Eyelids

See also Plates 24, 100, 110



Superior view

Medial palpebral a.
Lateral palpebral a.
Lacrimal gland
Supraorbital a.
Zygomatic branches of lacrimal a.
Posterior ciliary aa.
Muscular a.
Lacrimal a.
Supratrochlear a.
Dorsal nasal a.
Anterior meningeal branch of anterior ethmoidal a.
Anterior ethmoidal a.
Posterior ethmoidal a.
Muscular a.
Ophthalmic a.
Internal carotid a.

Anterior view

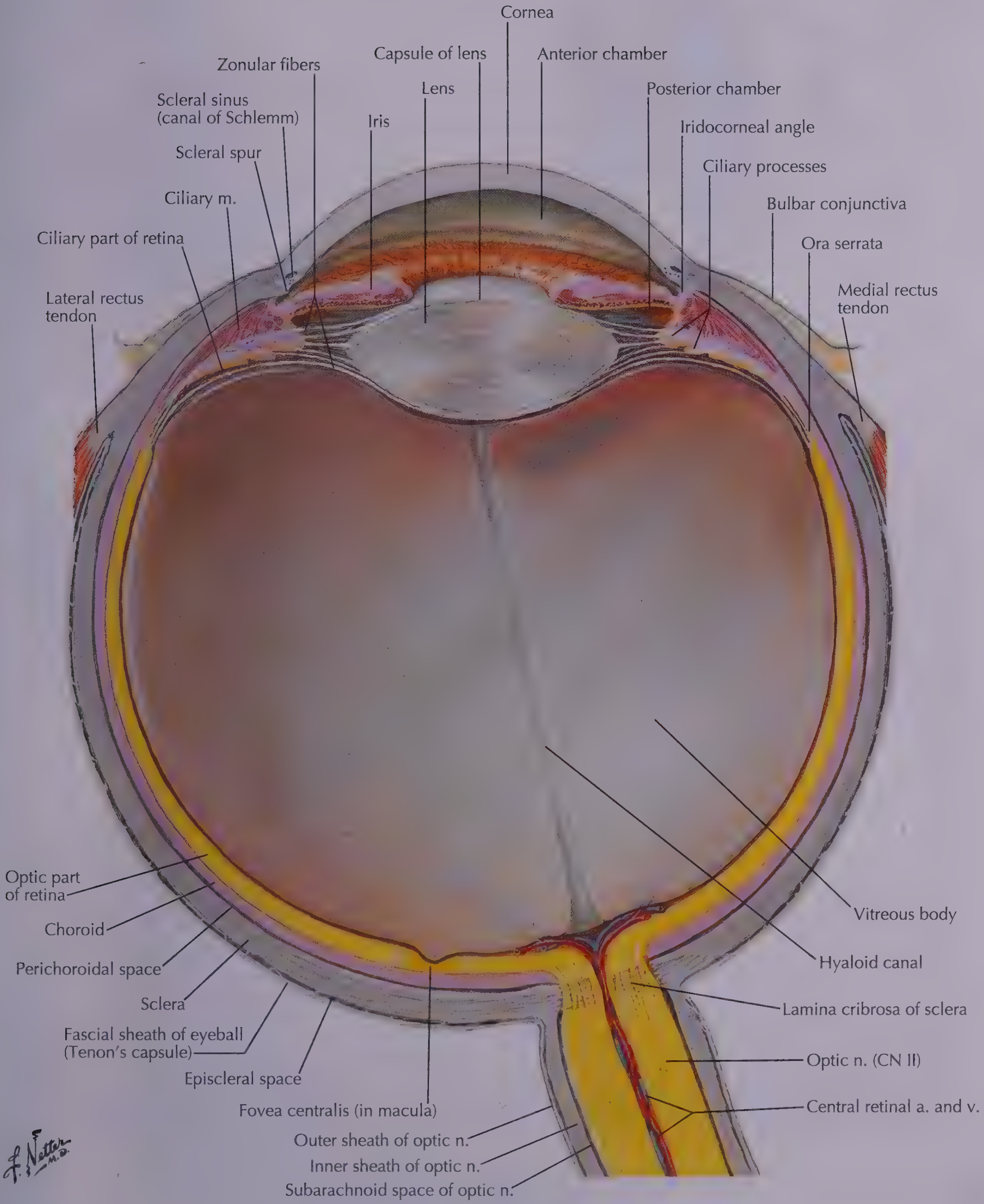
Supraorbital a.
Supratrochlear a.
Dorsal nasal a.
Superior medial palpebral a.
Angular a.
Superior palpebral arterial arch
Inferior medial palpebral a.
Inferior palpebral arterial arch
Facial a.
X
X
X
X
Frontal branch of superficial temporal a.
Superior lateral palpebral a.
Zygomaticoorbital a.
Inferior lateral palpebral a.
Zygomaticofacial a.
Transverse facial a.
Infraorbital a.

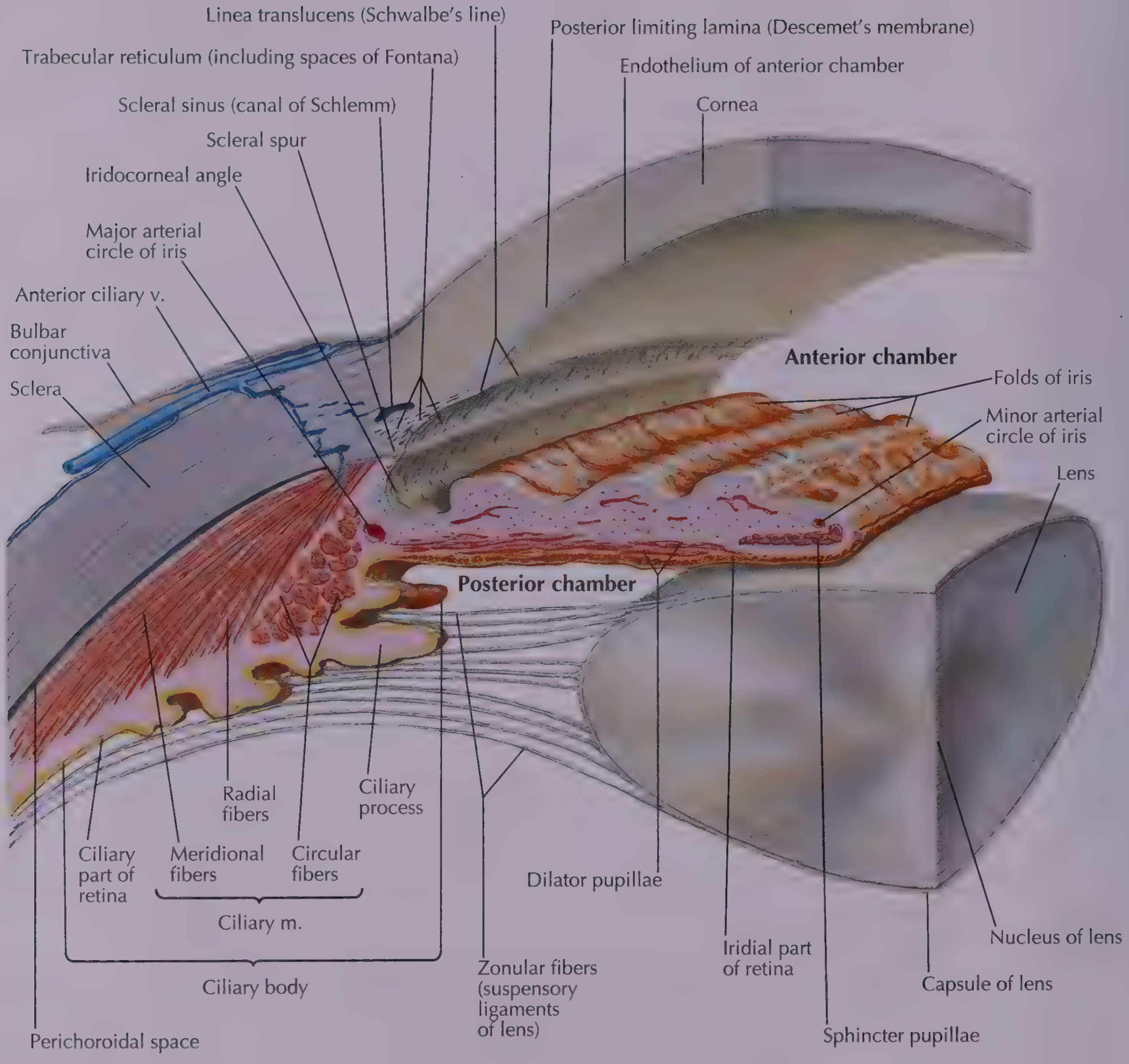
(X = anastomosis between branches of external and internal carotid arteries)

Lateral view

Supratrochlear v.
Supraorbital v.
Nasofrontal v.
Angular v.
Superior ophthalmic v.
Posterior ciliary vv.
Cavernous sinus
Inferior ophthalmic v.
Facial v.
Pterygoid venous plexus
Maxillary v.
Retromandibular v.
Deep facial v.

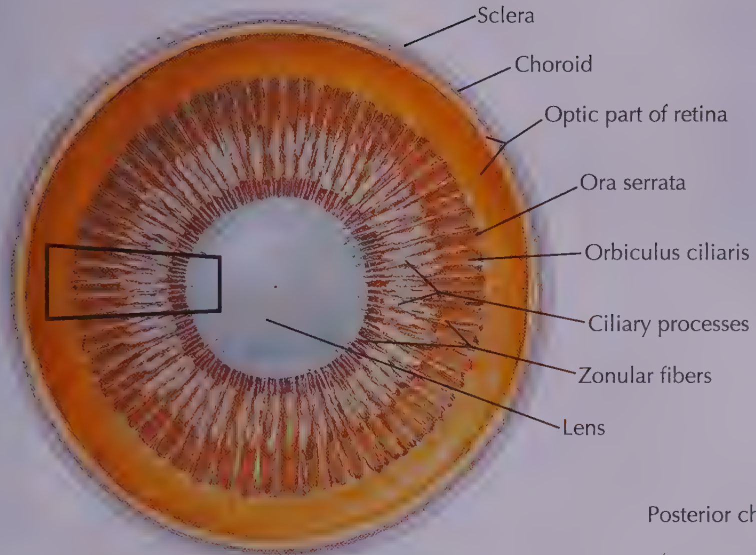
See also Plates 117, 118


Cornea
Capsule of lens
Anterior chamber
Zonular fibers
Lens
Posterior chamber
Scleral sinus (canal of Schlemm)
Iris
Iridocorneal angle
Scleral spur
Ciliary processes
Ciliary m.
Bulbar conjunctiva
Ciliary part of retina
Ora serrata
Lateral rectus tendon
Medial rectus tendon
Optic part of retina
Choroid
Perichoroidal space
Sclera
Fascial sheath of eyeball (Tenon's capsule)
Episcleral space
Fovea centralis (in macula)
Outer sheath of optic n.
Inner sheath of optic n.
Subarachnoid space of optic n.
Vitreous body
Hyaloid canal
Lamina cribrosa of sclera
Optic n. (CN II)
Central retinal a. and v.
F. Netter M.D.


Linea translucens (Schwalbe's line)
Trabecular reticulum (including spaces of Fontana)
Scleral sinus (canal of Schlemm)
Scleral spur
Iridocorneal angle
Major arterial circle of iris
Anterior ciliary v.
Bulbar conjunctiva
Sclera
Posterior limiting lamina (Descemet's membrane)
Endothelium of anterior chamber
Cornea
Anterior chamber
Folds of iris
Minor arterial circle of iris
Lens
Posterior chamber
Radial fibers
Ciliary process
Ciliary part of retina
Meridional fibers
Circular fibers
Ciliary m.
Ciliary body
Perichoroidal space
Dilator pupillae
Zonular fibers (suspensory ligaments of lens)
Iridial part of retina
Sphincter pupillae
Nucleus of lens
Capsule of lens

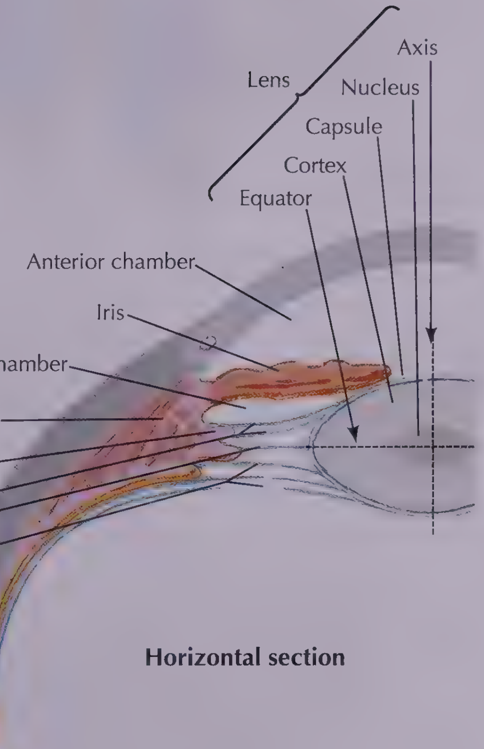
Note: For clarity, only single plane of zonular fibers shown; actually, fibers surround entire circumference of lens.

F. Netter M.D.

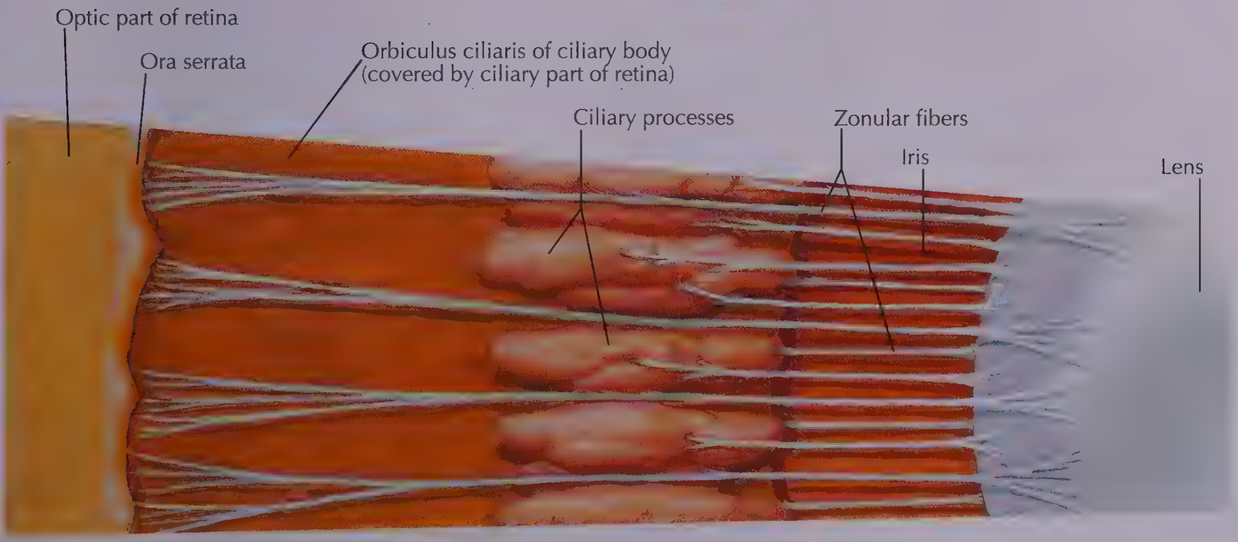

Sclera
Choroid
Optic part of retina
Ora serrata
Orbiculus ciliaris
Ciliary processes
Zonular fibers
Lens

Eyeball sectioned in coronal plane: anterior segment viewed from behind

F. Netter M.D.


Lens
Axis
Nucleus
Capsule
Cortex
Equator
Anterior chamber
Iris
Posterior chamber
Ciliary body
Ciliary process
Preequatorial zonular fibers
Equatorial zonular fibers
Postequatorial zonular fibers
Orbiculus ciliaris
Ora serrata
Optic part of retina

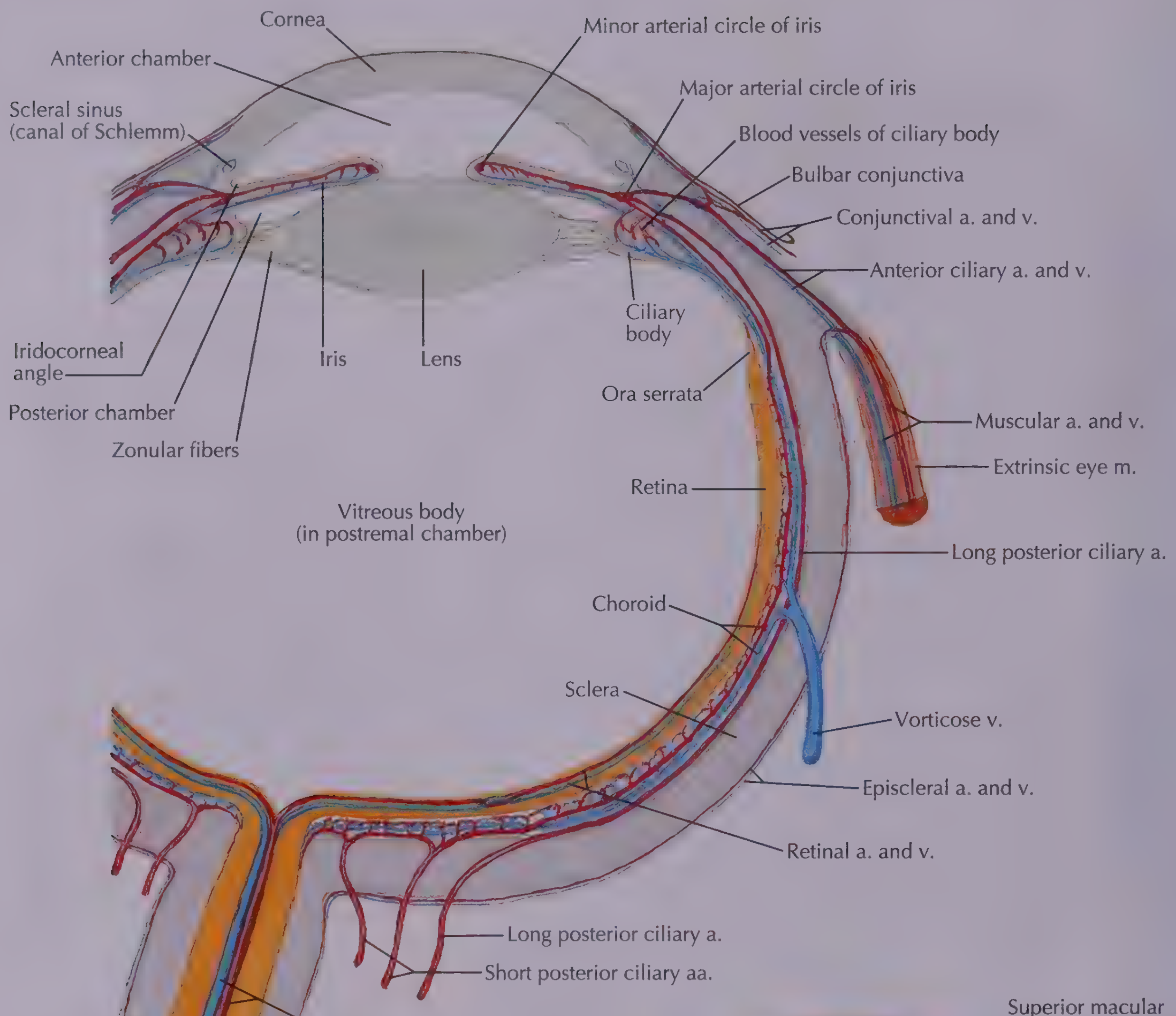
Horizontal section

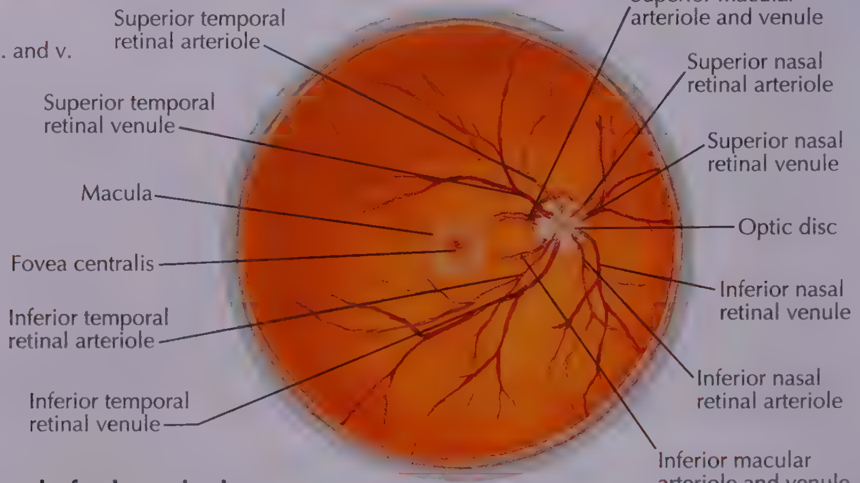

Optic part of retina
Ora serrata
Orbiculus ciliaris of ciliary body (covered by ciliary part of retina)
Ciliary processes
Zonular fibers
Iris
Lens

Enlargement of segment outlined in top illustration (semischematic)

Intrinsic Arteries and Veins of Eye

See also Plate 120


Cornea
Minor arterial circle of iris
Anterior chamber
Major arterial circle of iris
Scleral sinus
(canal of Schlemm)
Blood vessels of ciliary body
Bulbar conjunctiva
Conjunctival a. and v.
Anterior ciliary a. and v.
Ciliary body
Iridocorneal angle
Iris
Lens
Ora serrata
Posterior chamber
Muscular a. and v.
Zonular fibers
Extrinsic eye m.
Retina
Vitreous body
(in postremal chamber)
Long posterior ciliary a.
Choroid
Sclera
Vorticose v.
Episcleral a. and v.
Retinal a. and v.
Long posterior ciliary a.
Short posterior ciliary aa.
Central
retinal a. and v.
Optic n.
(CN II)

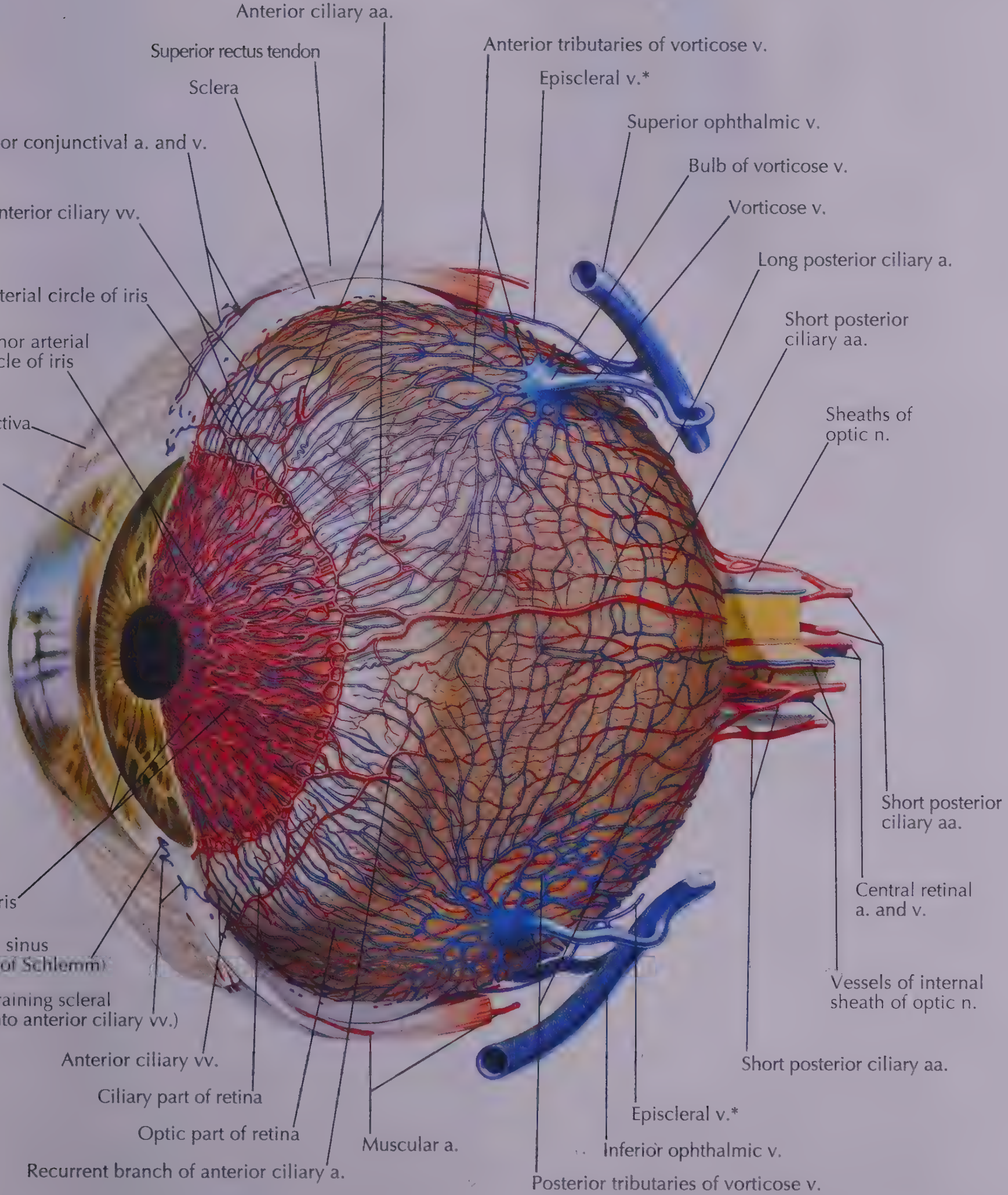

Superior temporal
retinal arteriole
Superior macular
arteriole and venule
Superior nasal
retinal arteriole
Superior temporal
retinal venule
Superior nasal
retinal venule
Macula
Optic disc
Fovea centralis
Inferior nasal
retinal venule
Inferior temporal
retinal arteriole
Inferior nasal
retinal arteriole
Inferior temporal
retinal venule
Inferior macular
arteriole and venule

Right retinal vessels: funduscopic view

Vascular Supply of Eye

See also Plate 116

Vascular arrangements within the vascular layer of eyeball


Anterior ciliary aa.
Superior rectus tendon
Sclera
Posterior conjunctival a. and v.
Anterior ciliary vv.
Major arterial circle of iris
Minor arterial circle of iris
Bulbar conjunctiva
Cornea
Iris
Scleral sinus (canal of Schlemm)
Veins draining scleral sinus (into anterior ciliary vv.)
Anterior ciliary vv.
Ciliary part of retina
Optic part of retina
Recurrent branch of anterior ciliary a.
Muscular a.
Anterior tributaries of vorticose v.
Episcleral v.*
Superior ophthalmic v.
Bulb of vorticose v.
Vorticose v.
Long posterior ciliary a.
Short posterior ciliary aa.
Sheaths of optic n.
Short posterior ciliary aa.
Central retinal a. and v.
Vessels of internal sheath of optic n.
Short posterior ciliary aa.
Episcleral v.*
Inferior ophthalmic v.
Posterior tributaries of vorticose v.
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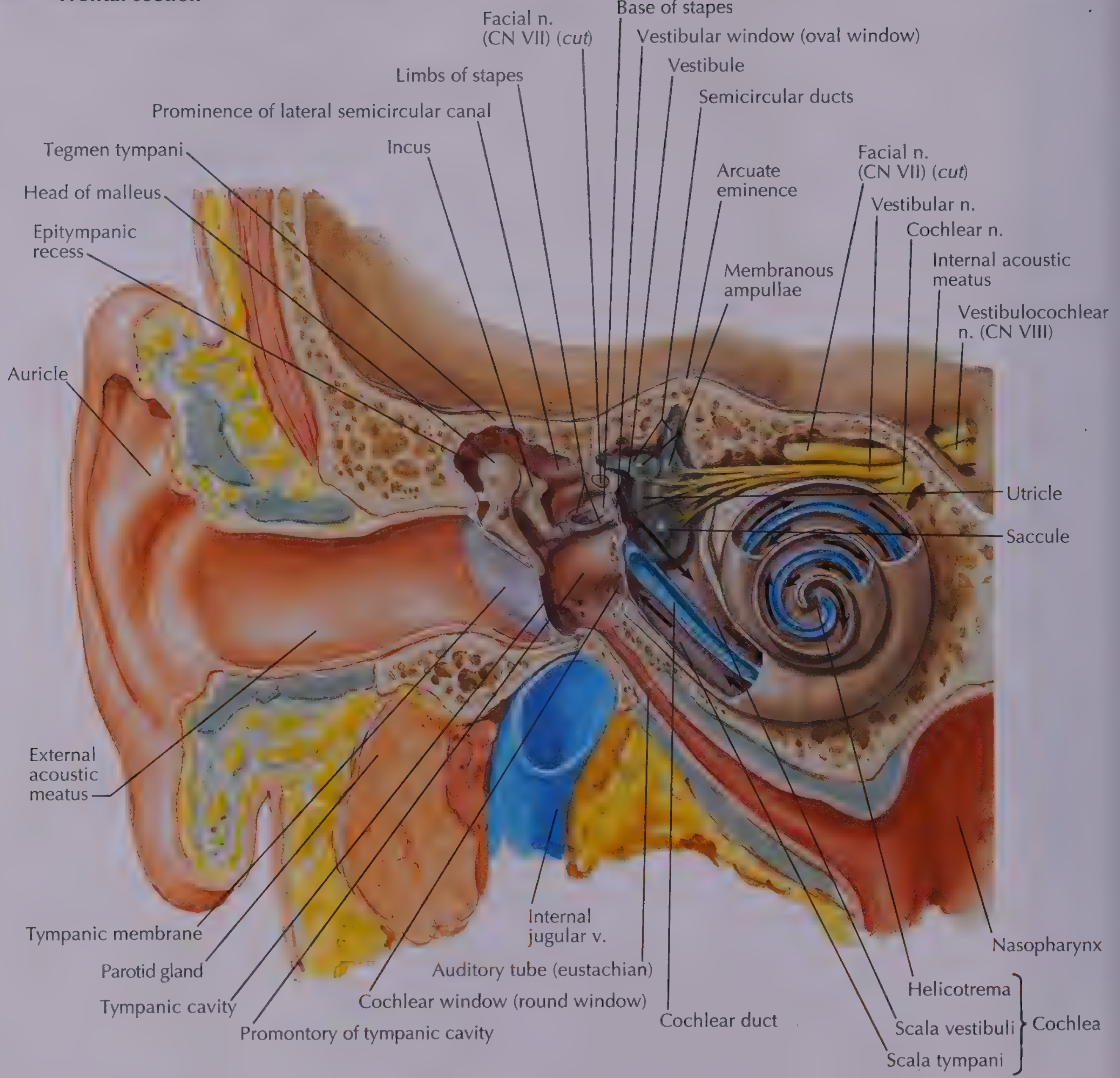
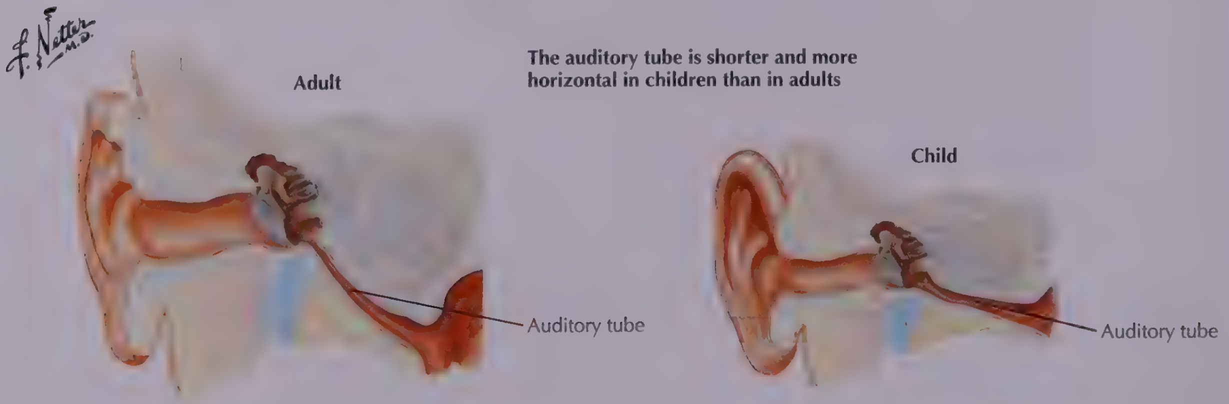
**The episcleral veins are shown here anastomosing with the vorticose veins, which they do; however, they also drain into the anterior ciliary veins.*

Ear and Course of Sound in Cochlea

See also Plates BP 28, BP 29, BP 30

Frontal section

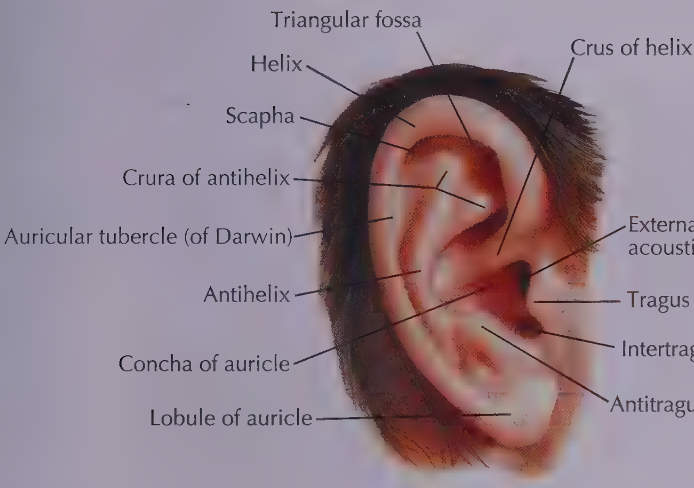

Base of stapes
Facial n. (CN VII) (cut)
Vestibular window (oval window)
Vestibule
Limbs of stapes
Semicircular ducts
Prominence of lateral semicircular canal
Tegmen tympani
Incus
Arcuate eminence
Facial n. (CN VII) (cut)
Head of malleus
Vestibular n.
Epitympanic recess
Cochlear n.
Membranous ampullae
Internal acoustic meatus
Vestibulocochlear n. (CN VIII)
Auricle
Utricle
Saccule
External acoustic meatus
Tympanic membrane
Internal jugular v.
Nasopharynx
Parotid gland
Auditory tube (eustachian)
Helicotrema
Tympanic cavity
Cochlear window (round window)
Cochlear duct
Scala vestibuli
Cochlea
Promontory of tympanic cavity
Scala tympani


Adult
Auditory tube
Child
Auditory tube

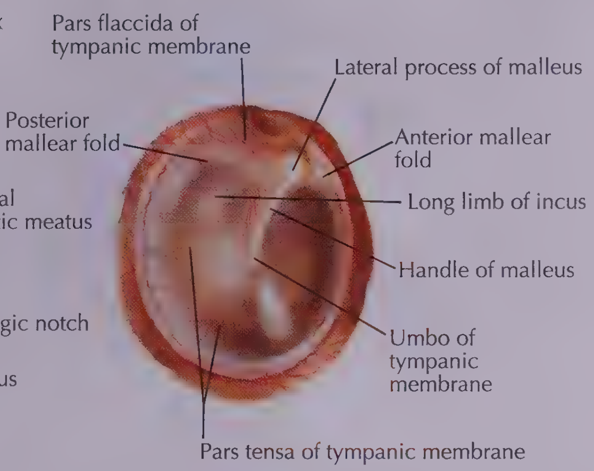
The auditory tube is shorter and more horizontal in children than in adults

See also Plates 123, BP 28

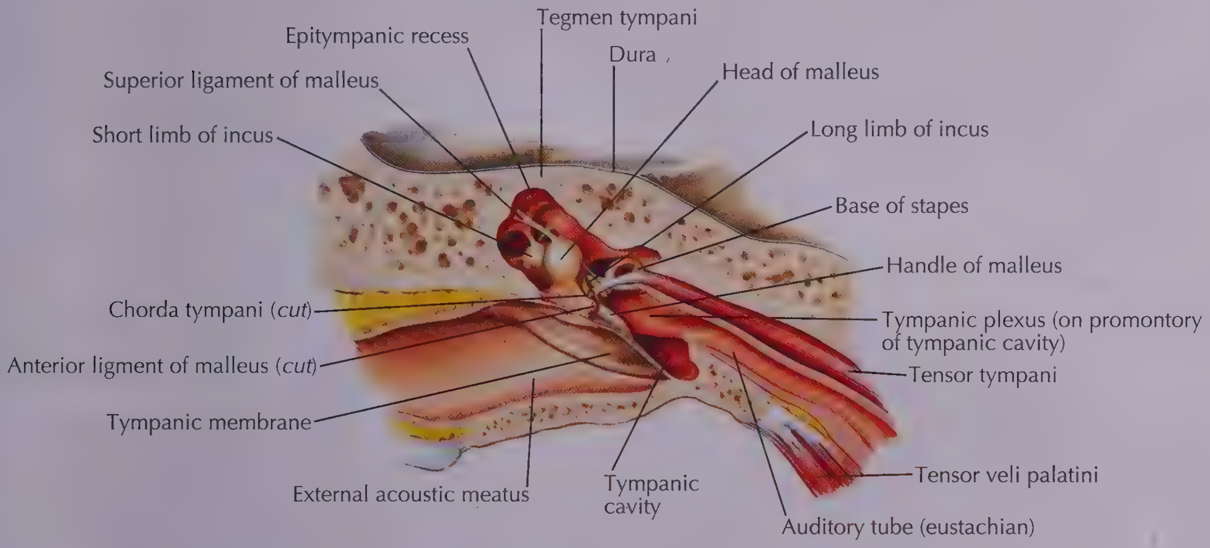
Right auricle


Triangular fossa
Helix
Scapha
Crura of antihelix
Auricular tubercle (of Darwin)
Antihelix
Concha of auricle
Lobule of auricle
Crus of helix
External acoustic meatus
Tragus
Intertragic notch
Antitragus

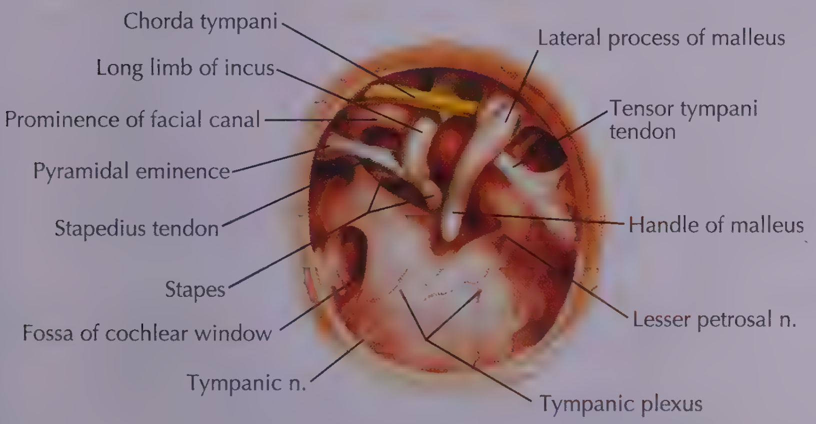
Otoscopic view of right tympanic membrane


Pars flaccida of tympanic membrane
Lateral process of malleus
Posterior mallear fold
Anterior mallear fold
Long limb of incus
Handle of malleus
Umbo of tympanic membrane
Pars tensa of tympanic membrane

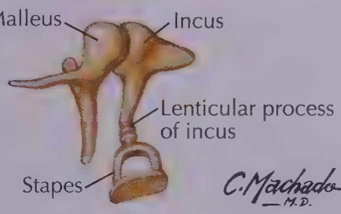
Coronal oblique section of external acoustic meatus and middle ear


Tegmen tympani
Epitympanic recess
Dura
Superior ligament of malleus
Head of malleus
Short limb of incus
Long limb of incus
Base of stapes
Handle of malleus
Chorda tympani (cut)
Tympanic plexus (on promontory of tympanic cavity)
Anterior ligment of malleus (cut)
Tensor tympani
Tympanic membrane
Tensor veli palatini
External acoustic meatus
Tympanic cavity
Auditory tube (eustachian)

Right tympanic cavity after removal of tympanic membrane (lateral view)


Chorda tympani
Lateral process of malleus
Long limb of incus
Prominence of facial canal
Tensor tympani tendon
Pyramidal eminence
Stapedius tendon
Handle of malleus
Stapes
Fossa of cochlear window
Lesser petrosal n.
Tympanic n.
Tympanic plexus

Auditory ossicles: medial view


Malleus
Incus
Lenticular process of incus
Stapes

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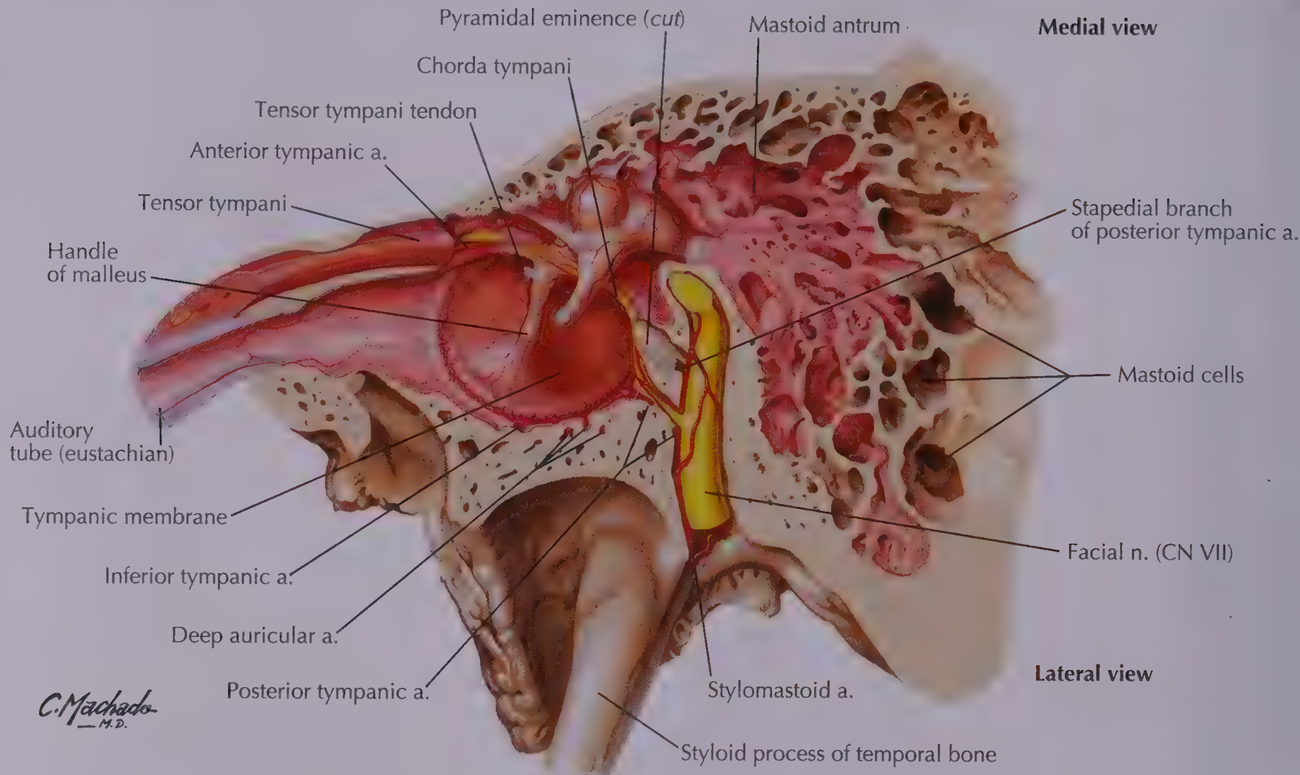
F. Netter M.D.

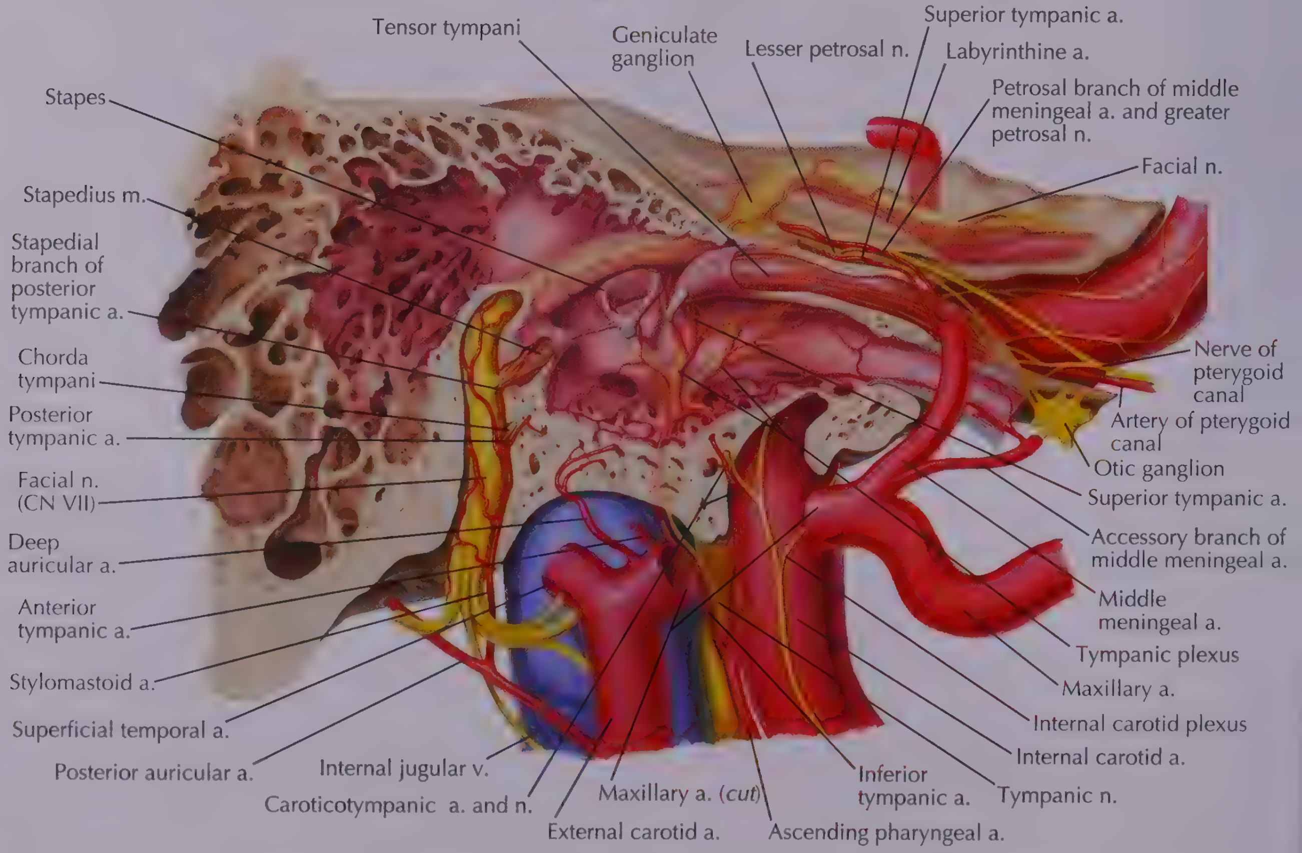
Tympanic Cavity

See also Plates 77, 162, BP 28

Medial view

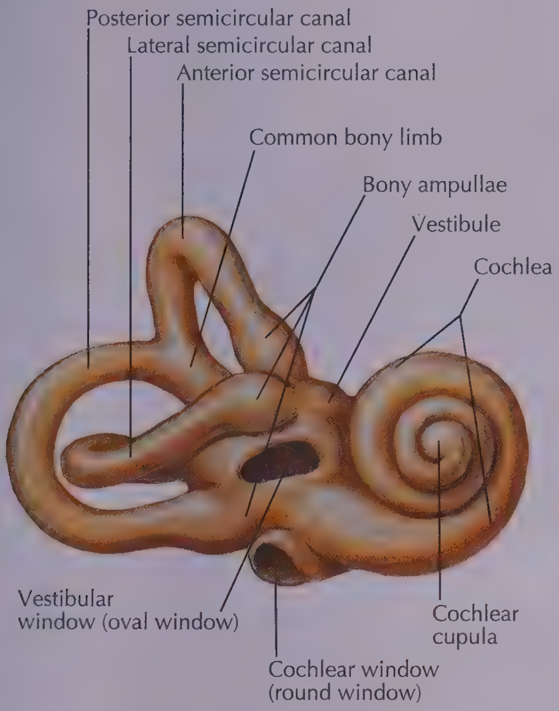

Pyramidal eminence (*cut*)
Mastoid antrum
Chorda tympani
Tensor tympani tendon
Anterior tympanic a.
Tensor tympani
Handle of malleus
Stapedial branch of posterior tympanic a.
Mastoid cells
Auditory tube (eustachian)
Tympanic membrane
Inferior tympanic a.
Deep auricular a.
Posterior tympanic a.
Facial n. (CN VII)
Stylomastoid a.
Styloid process of temporal bone
C.Machado M.D.

Lateral view

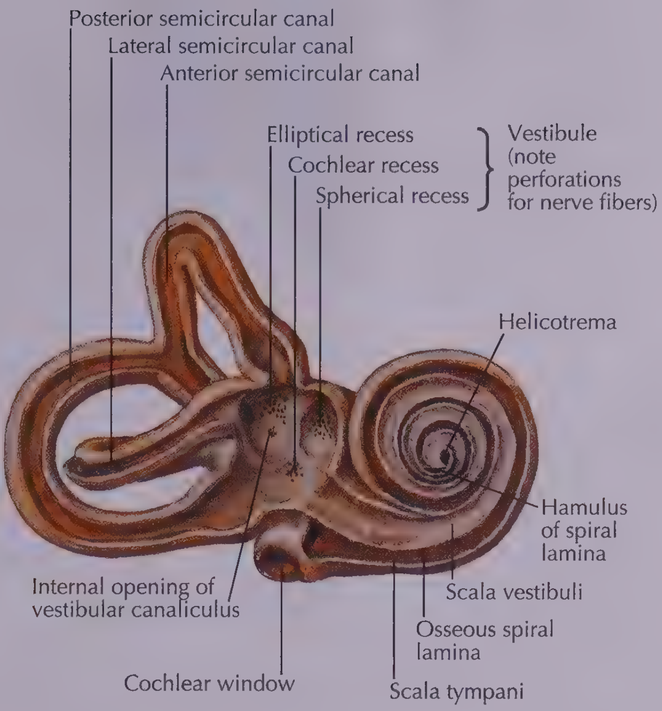

Tensor tympani
Geniculate ganglion
Lesser petrosal n.
Superior tympanic a.
Labyrinthine a.
Petrosal branch of middle meningeal a. and greater petrosal n.
Facial n.
Stapes
Stapedius m.
Stapedial branch of posterior tympanic a.
Chorda tympani
Posterior tympanic a.
Facial n. (CN VII)
Deep auricular a.
Anterior tympanic a.
Stylomastoid a.
Superficial temporal a.
Posterior auricular a.
Internal jugular v.
Caroticotympanic a. and n.
External carotid a.
Maxillary a. (*cut*)
Ascending pharyngeal a.
Inferior tympanic a.
Tympanic n.
Internal carotid a.
Internal carotid plexus
Maxillary a.
Tympanic plexus
Middle meningeal a.
Accessory branch of middle meningeal a.
Superior tympanic a.
Otic ganglion
Artery of pterygoid canal
Nerve of pterygoid canal

See also Plate 151

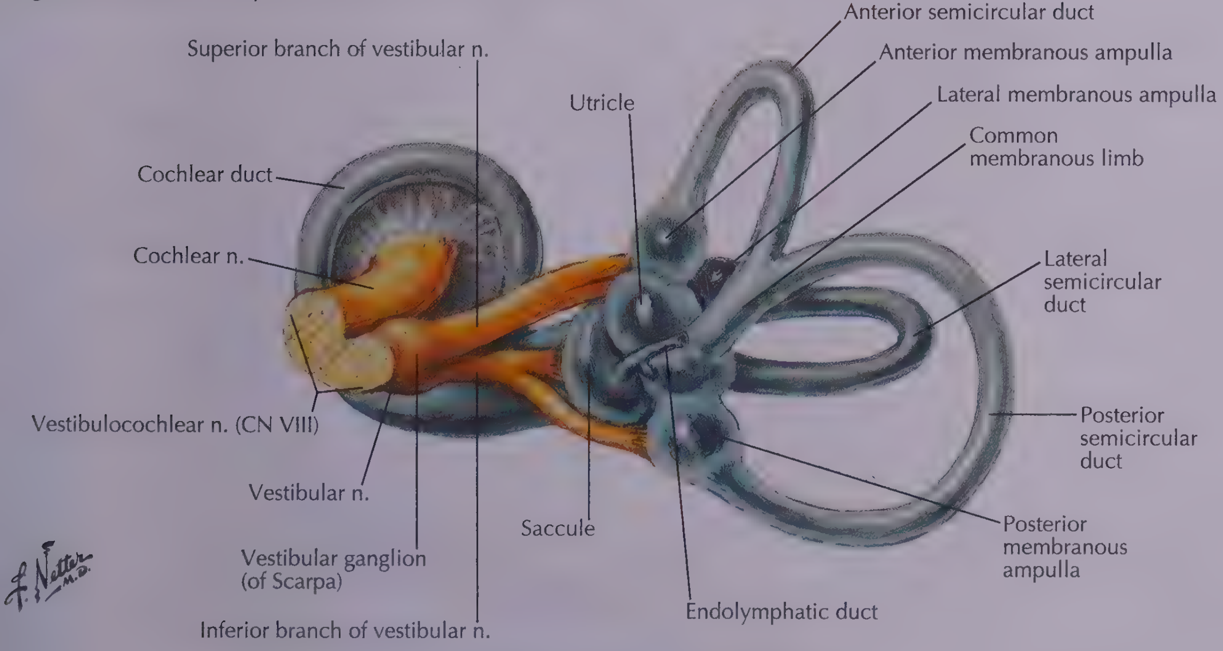
Right bony labyrinth (otic capsule), anterolateral view: surrounding cancellous bone removed


Posterior semicircular canal
Lateral semicircular canal
Anterior semicircular canal
Common bony limb
Bony ampullae
Vestibule
Cochlea
Vestibular window (oval window)
Cochlear cupula
Cochlear window (round window)

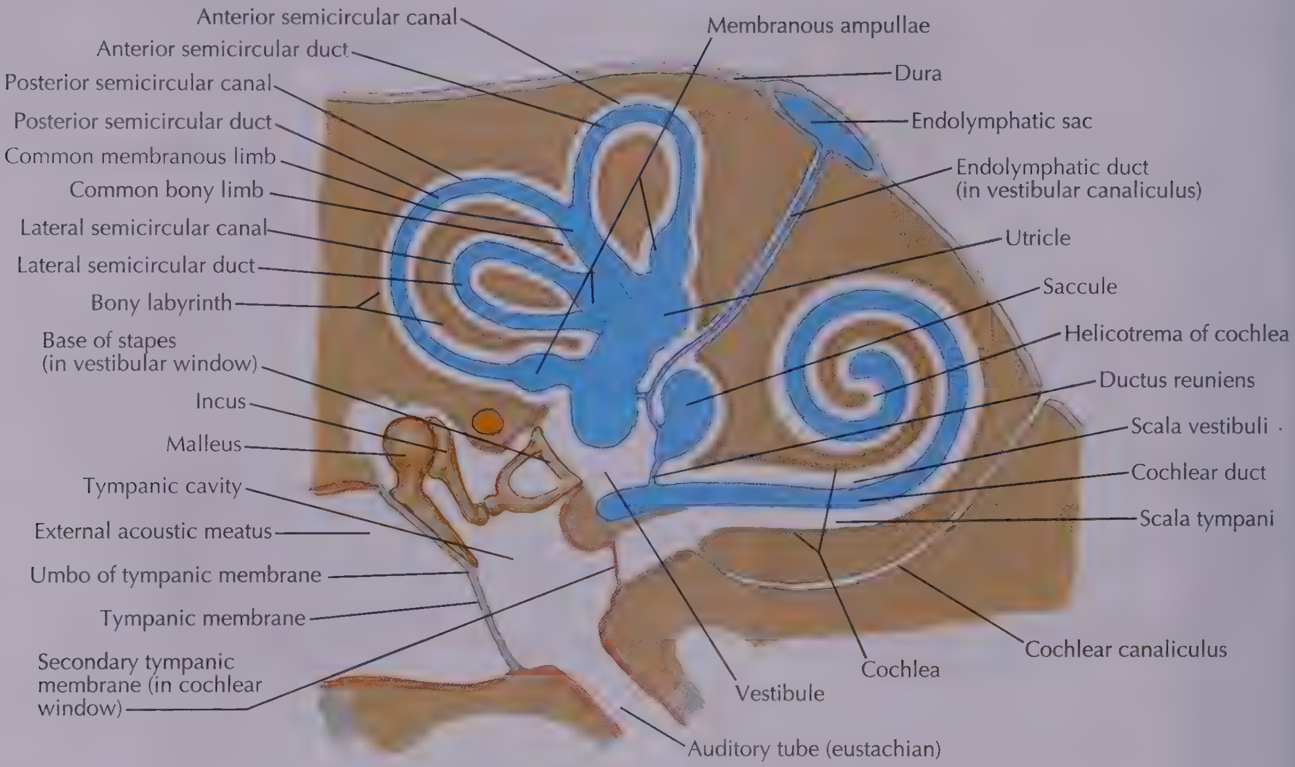
Dissected right bony labyrinth (otic capsule): membranous labyrinth removed


Posterior semicircular canal
Lateral semicircular canal
Anterior semicircular canal
Elliptical recess
Cochlear recess
Spherical recess
Vestibule (note perforations for nerve fibers)
Helicotrema
Hamulus of spiral lamina
Scala vestibuli
Osseous spiral lamina
Internal opening of vestibular canaliculus
Cochlear window
Scala tympani

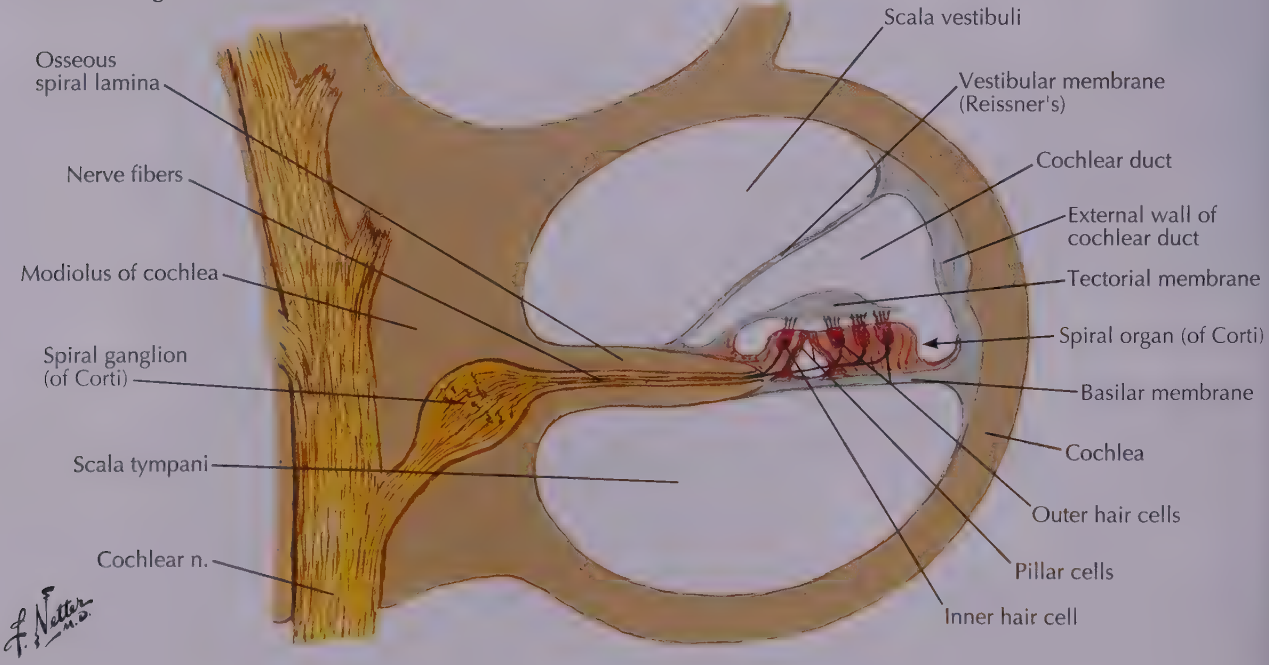
Right membranous labyrinth with nerves: medial view


Anterior semicircular duct
Superior branch of vestibular n.
Anterior membranous ampulla
Utricle
Lateral membranous ampulla
Common membranous limb
Cochlear duct
Cochlear n.
Lateral semicircular duct
Vestibulocochlear n. (CN VIII)
Posterior semicircular duct
Vestibular n.
Saccule
Posterior membranous ampulla
Vestibular ganglion (of Scarpa)
Endolymphatic duct
Inferior branch of vestibular n.
F. Netter M.D.

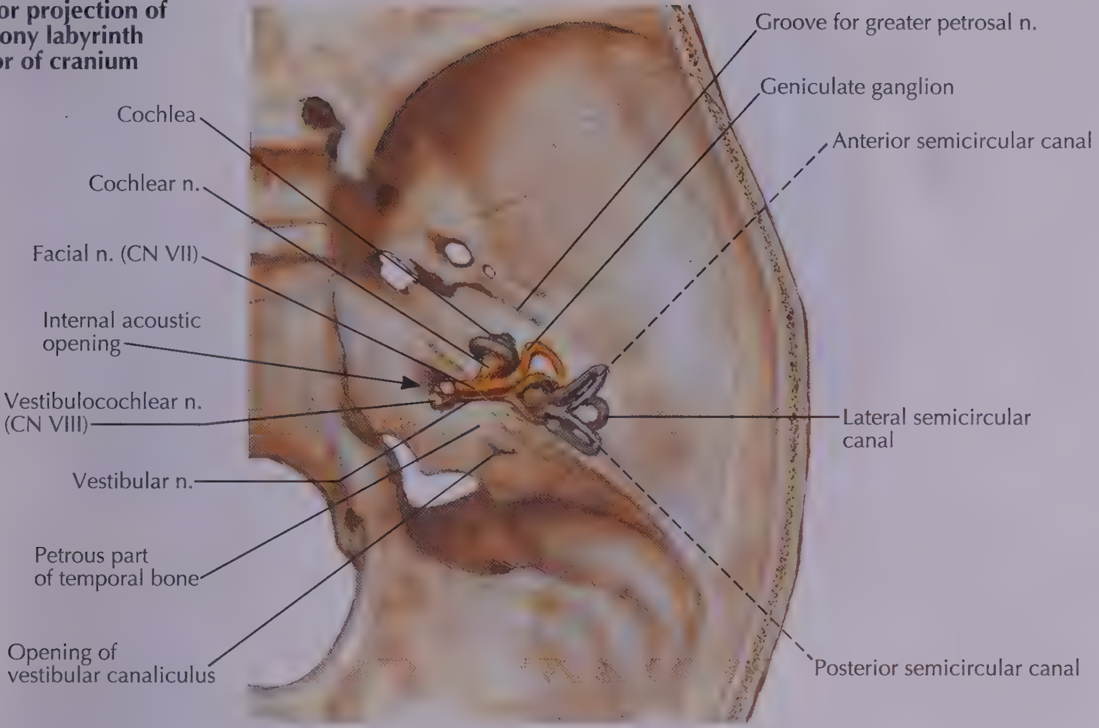
Bony and membranous labyrinths: schema


Anterior semicircular canal
Anterior semicircular duct
Posterior semicircular canal
Posterior semicircular duct
Common membranous limb
Common bony limb
Lateral semicircular canal
Lateral semicircular duct
Bony labyrinth
Base of stapes (in vestibular window)
Incus
Malleus
Tympanic cavity
External acoustic meatus
Umbo of tympanic membrane
Tympanic membrane
Secondary tympanic membrane (in cochlear window)
Membranous ampullae
Dura
Endolymphatic sac
Endolymphatic duct (in vestibular canaliculus)
Utricle
Saccule
Helicotrema of cochlea
Ductus reuniens
Scala vestibuli
Cochlear duct
Scala tympani
Cochlear canaliculus
Cochlea
Vestibule
Auditory tube (eustachian)

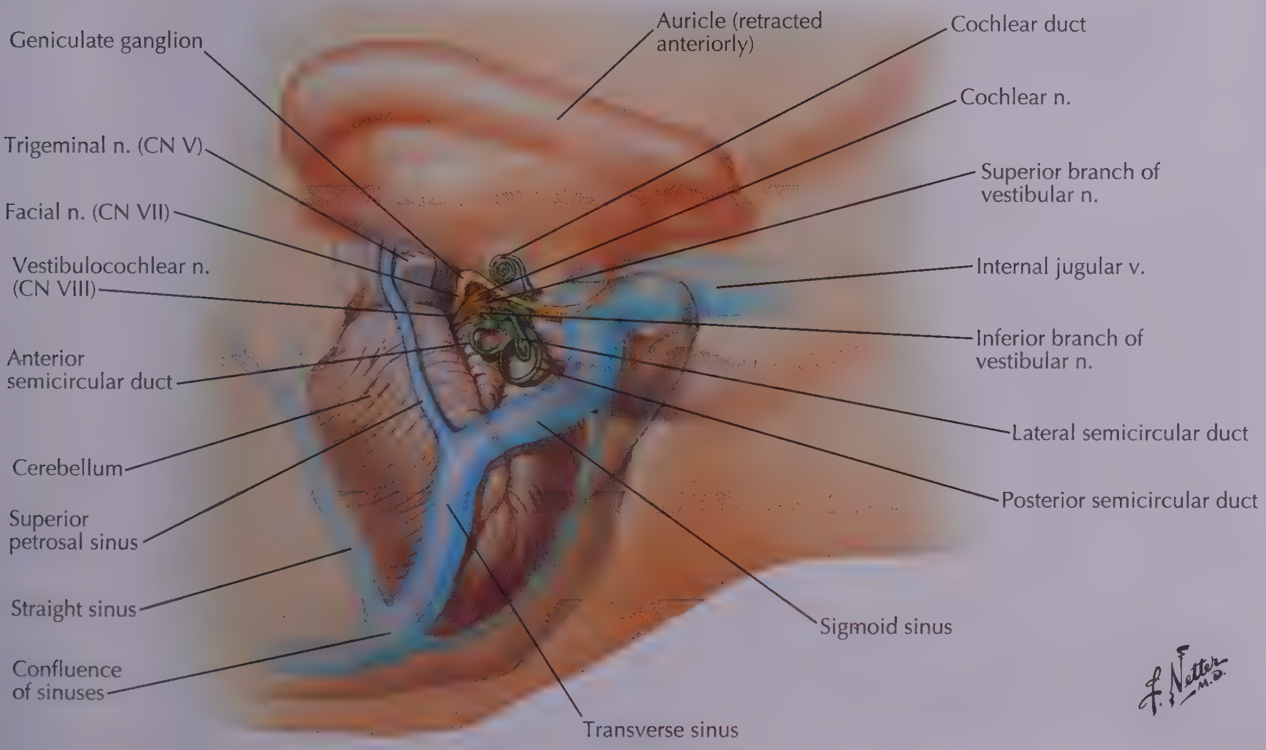
Section through turn of cochlea


Osseous spiral lamina
Nerve fibers
Modiolus of cochlea
Spiral ganglion (of Corti)
Scala tympani
Cochlear n.
F. Netter M.D.
Scala vestibuli
Vestibular membrane (Reissner's)
Cochlear duct
External wall of cochlear duct
Tectorial membrane
Spiral organ (of Corti)
Basilar membrane
Cochlea
Outer hair cells
Pillar cells
Inner hair cell

Superior projection of right bony labyrinth on floor of cranium

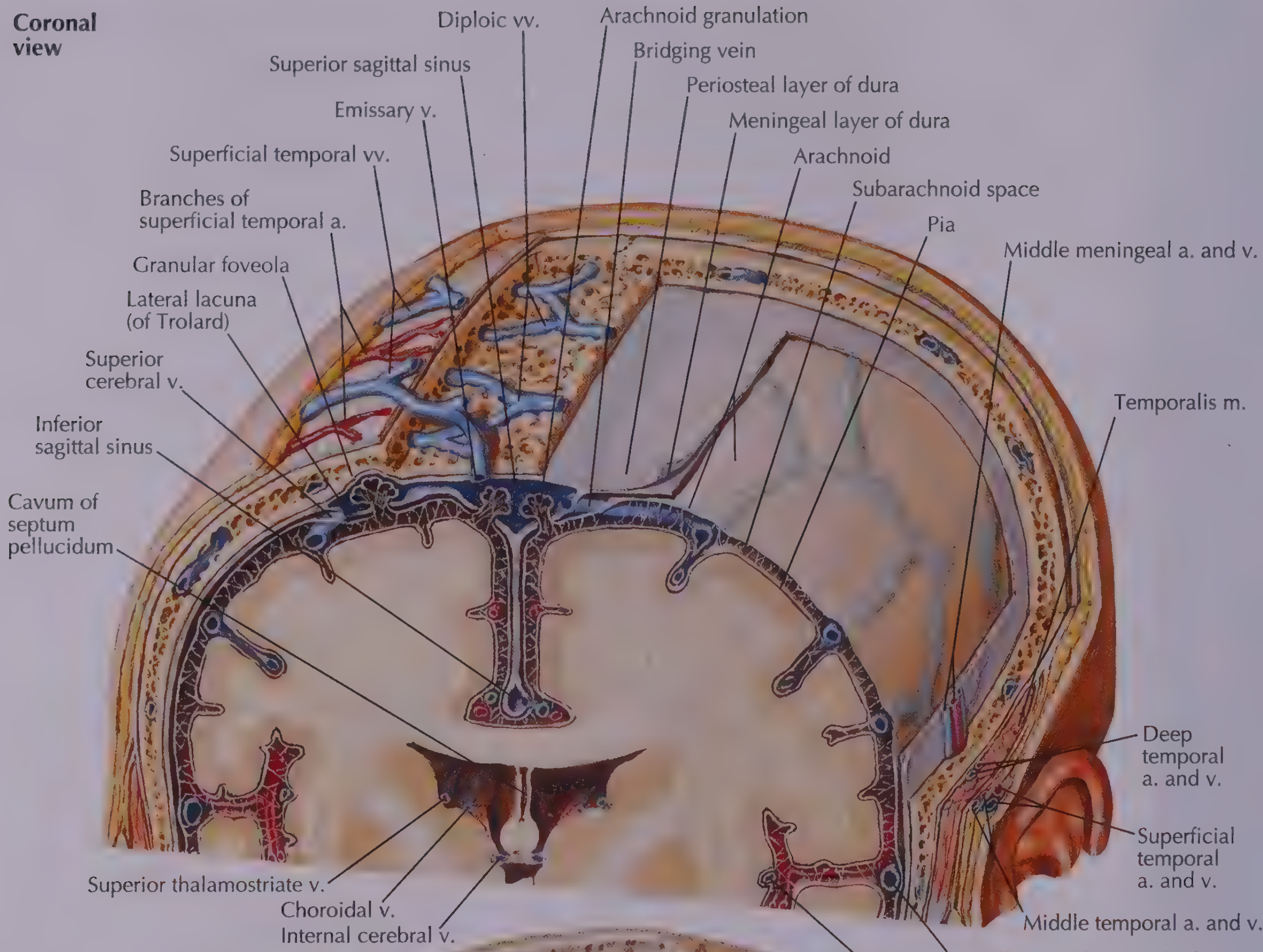

Cochlea
Cochlear n.
Facial n. (CN VII)
Internal acoustic opening
Vestibulocochlear n. (CN VIII)
Vestibular n.
Petrous part of temporal bone
Opening of vestibular canaliculus
Groove for greater petrosal n.
Geniculate ganglion
Anterior semicircular canal
Lateral semicircular canal
Posterior semicircular canal

Lateral projection of right membranous labyrinth


Geniculate ganglion
Trigeminal n. (CN V)
Facial n. (CN VII)
Vestibulocochlear n. (CN VIII)
Anterior semicircular duct
Cerebellum
Superior petrosal sinus
Straight sinus
Confluence of sinuses
Transverse sinus
Auricle (retracted anteriorly)
Cochlear duct
Cochlear n.
Superior branch of vestibular n.
Internal jugular v.
Inferior branch of vestibular n.
Lateral semicircular duct
Posterior semicircular duct
Sigmoid sinus
F. Netter M.D.

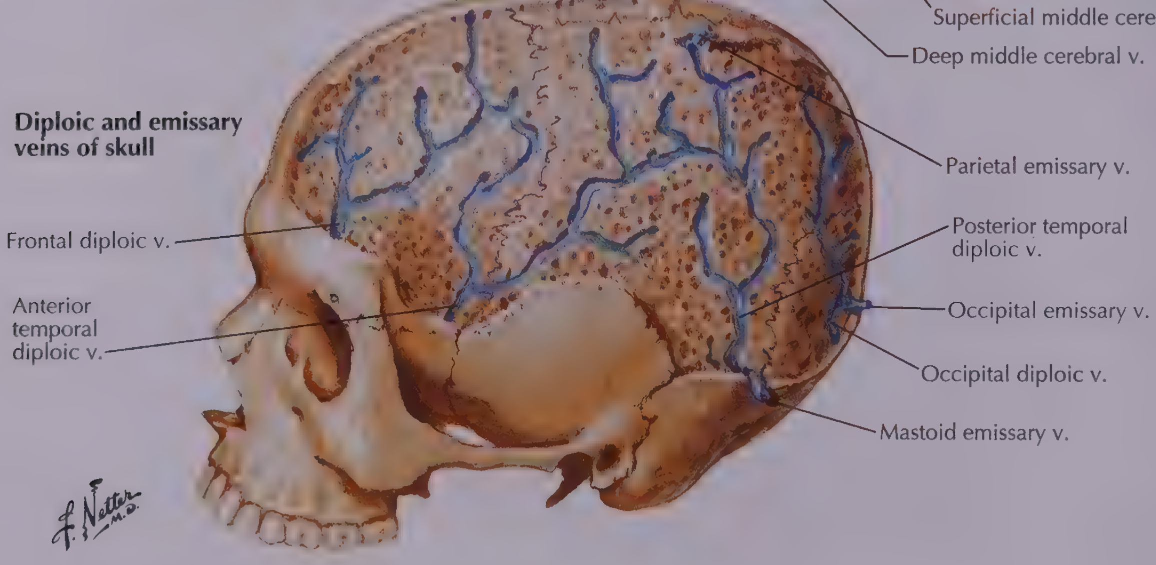
Meninges and Diploic Veins

See also Plate 24



Coronal view

Diploic vv.
Arachnoid granulation
Bridging vein
Superior sagittal sinus
Periosteal layer of dura
Emissary v.
Meningeal layer of dura
Superficial temporal vv.
Arachnoid
Branches of superficial temporal a.
Subarachnoid space
Pia
Granular foveola
Middle meningeal a. and v.
Lateral lacuna (of Trolard)
Superior cerebral v.
Temporalis m.
Inferior sagittal sinus
Cavum of septum pellucidum
Deep temporal a. and v.
Superficial temporal a. and v.
Superior thalamostriate v.
Choroidal v.
Internal cerebral v.
Middle temporal a. and v.
Superficial middle cerebral v.
Deep middle cerebral v.

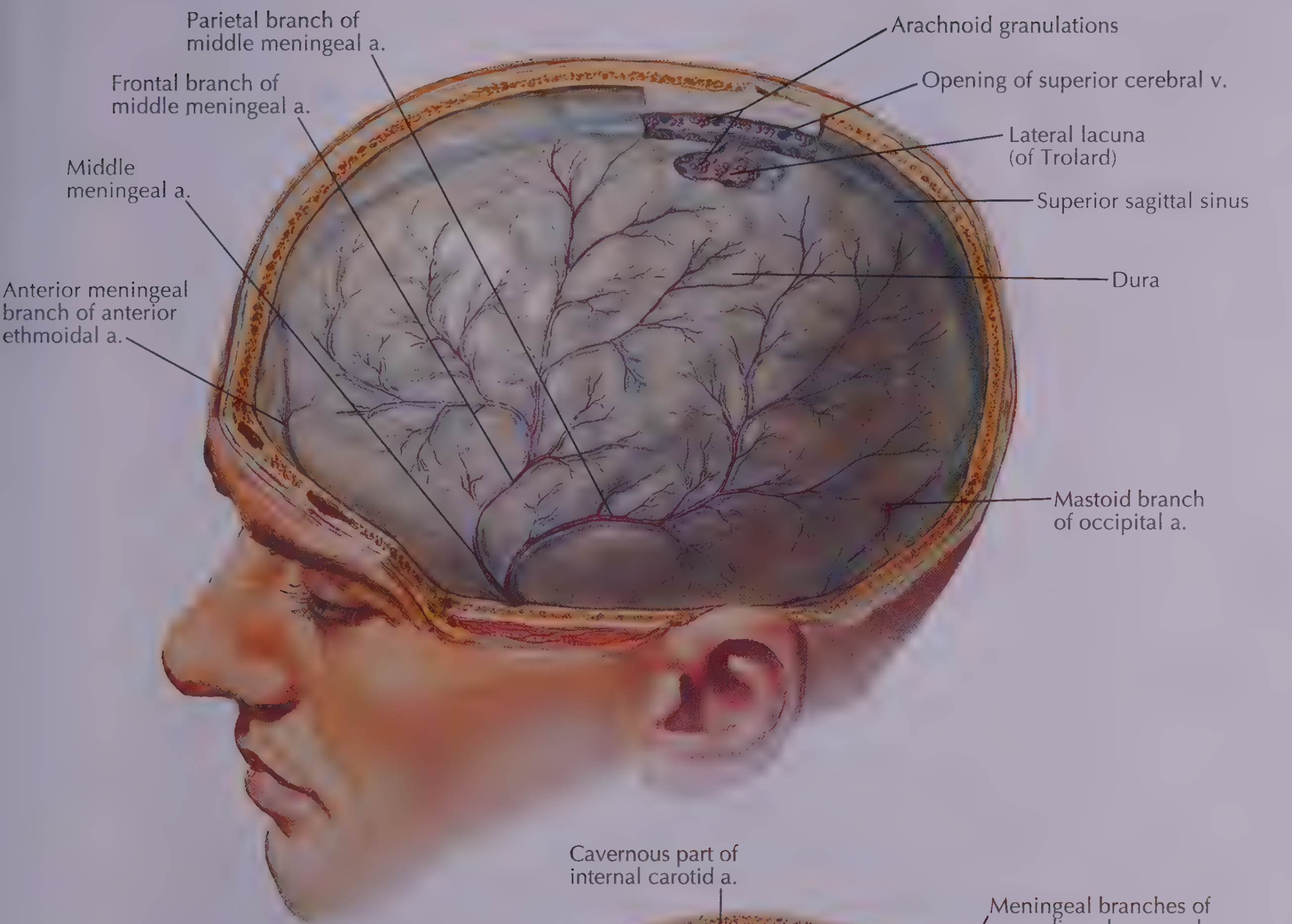


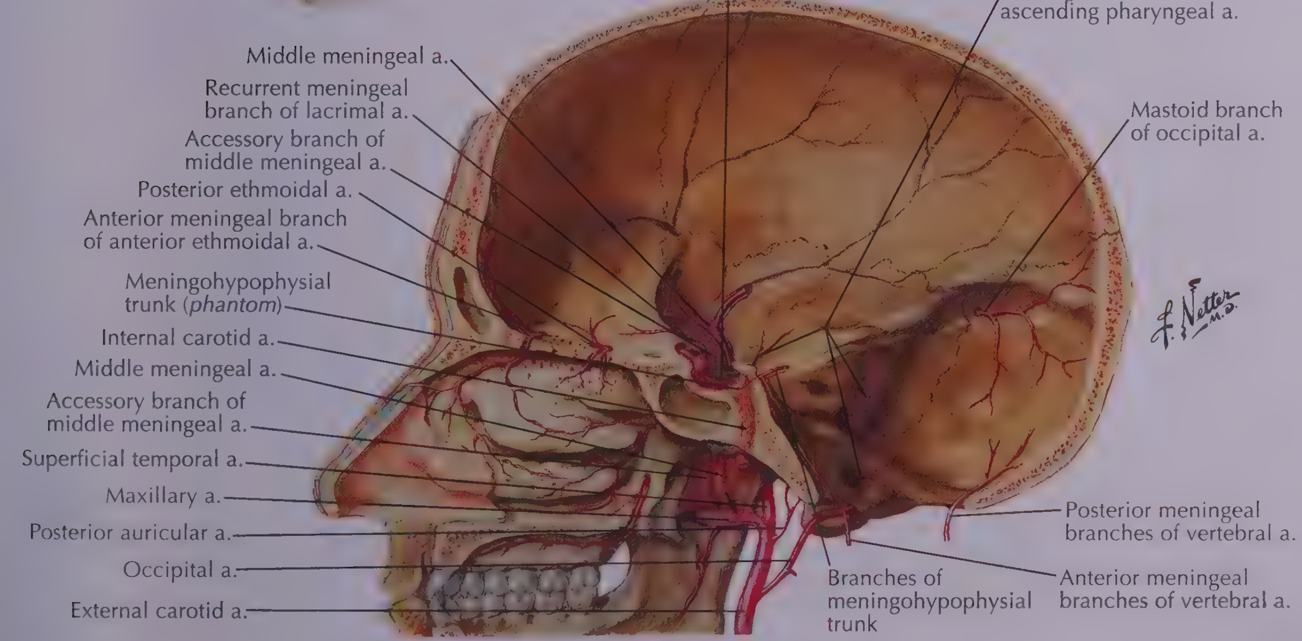
Diploic and emissary veins of skull

Parietal emissary v.
Frontal diploic v.
Posterior temporal diploic v.
Anterior temporal diploic v.
Occipital emissary v.
Occipital diploic v.
Mastoid emissary v.
F. Netter M.D.

Meningeal Arteries

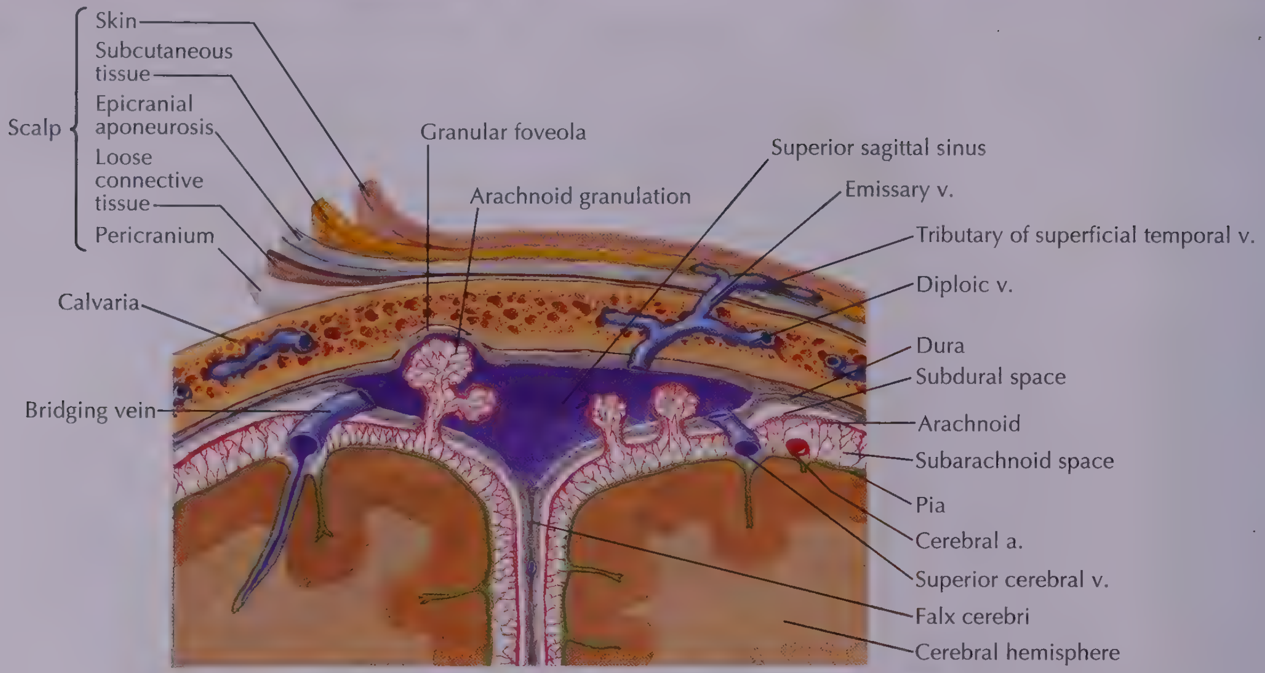
See also Plate 163


Parietal branch of middle meningeal a.
Frontal branch of middle meningeal a.
Middle meningeal a.
Anterior meningeal branch of anterior ethmoidal a.
Arachnoid granulations
Opening of superior cerebral v.
Lateral lacuna (of Trolard)
Superior sagittal sinus
Dura
Mastoid branch of occipital a.

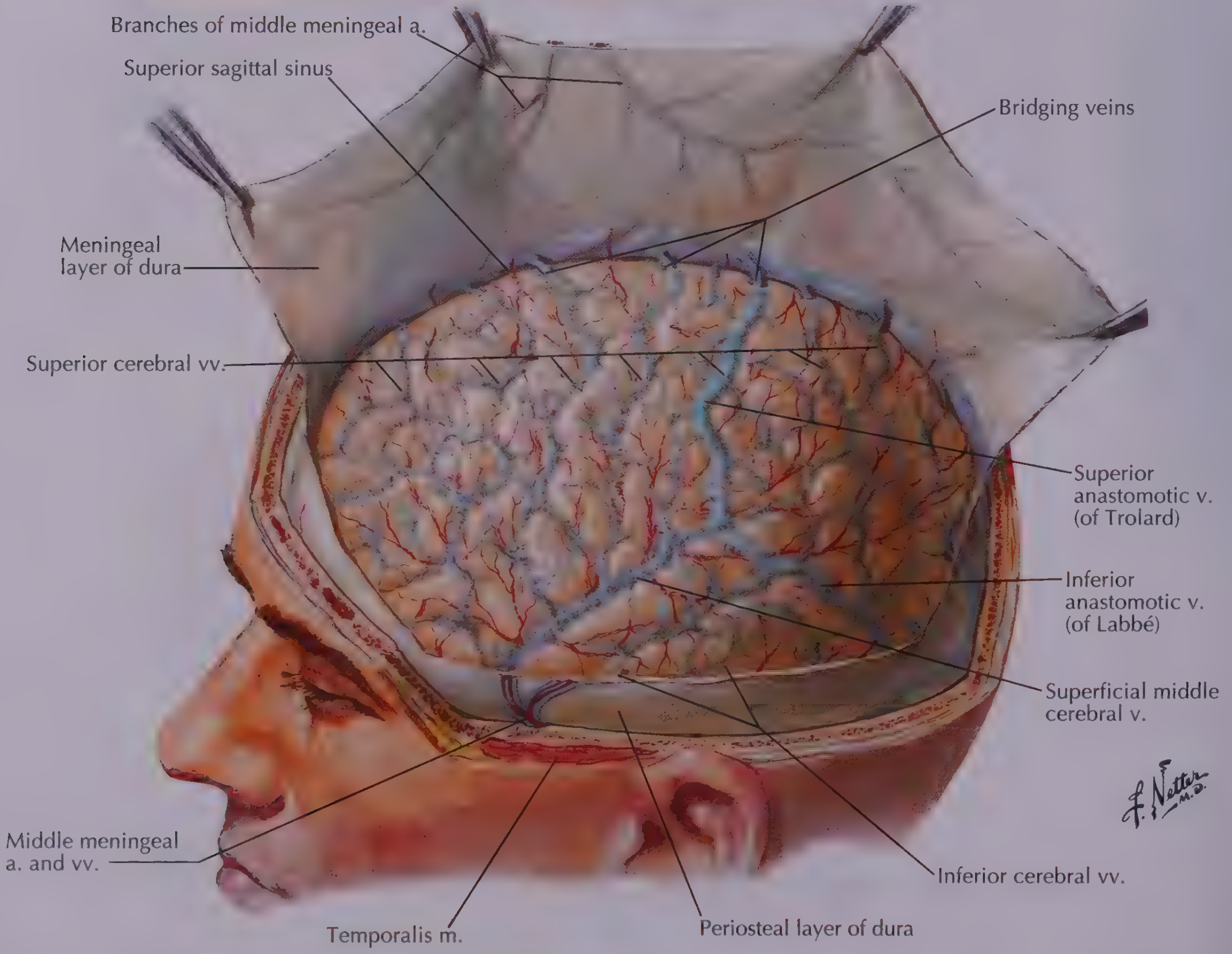

Cavernous part of internal carotid a.
Meningeal branches of ascending pharyngeal a.
Middle meningeal a.
Recurrent meningeal branch of lacrimal a.
Accessory branch of middle meningeal a.
Posterior ethmoidal a.
Anterior meningeal branch of anterior ethmoidal a.
Meningohypophysial trunk (*phantom*)
Internal carotid a.
Middle meningeal a.
Accessory branch of middle meningeal a.
Superficial temporal a.
Maxillary a.
Posterior auricular a.
Occipital a.
External carotid a.
Mastoid branch of occipital a.
F. Netter M.D.
Posterior meningeal branches of vertebral a.
Anterior meningeal branches of vertebral a.
Branches of meningohypophysial trunk

Meninges and Superficial Cerebral Veins

For deep veins of brain see Plate 172

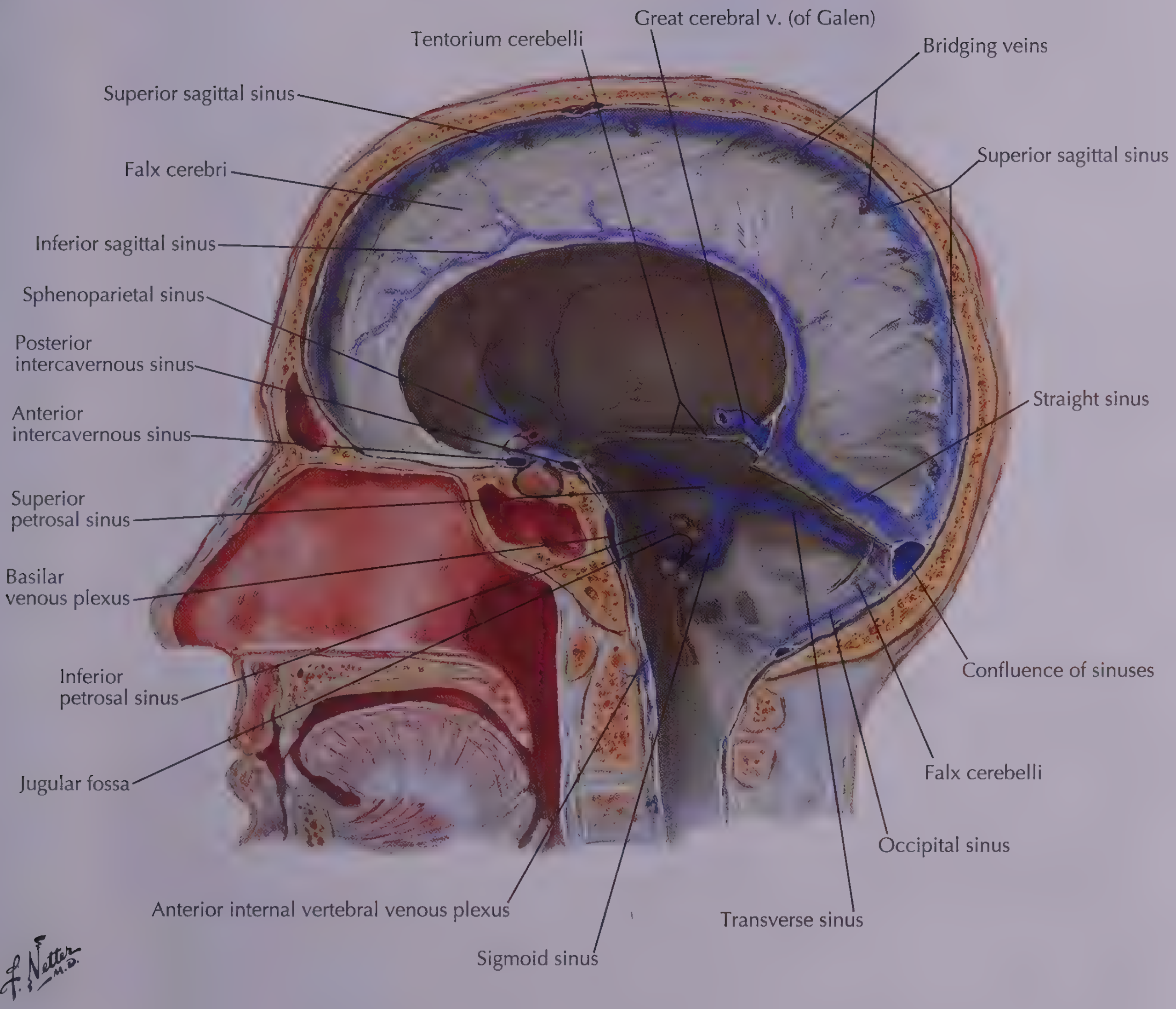


Scalp
Skin
Subcutaneous tissue
Epicranial aponeurosis
Loose connective tissue
Pericranium
Calvaria
Bridging vein
Granular foveola
Arachnoid granulation
Superior sagittal sinus
Emissary v.
Tributary of superficial temporal v.
Diploic v.
Dura
Subdural space
Arachnoid
Subarachnoid space
Pia
Cerebral a.
Superior cerebral v.
Falx cerebri
Cerebral hemisphere



Branches of middle meningeal a.
Superior sagittal sinus
Bridging veins
Meningeal layer of dura
Superior cerebral vv.
Superior anastomotic v. (of Trolard)
Inferior anastomotic v. (of Labbé)
Superficial middle cerebral v.
Middle meningeal a. and vv.
Inferior cerebral vv.
Temporalis m.
Periosteal layer of dura
F. Netter M.D.

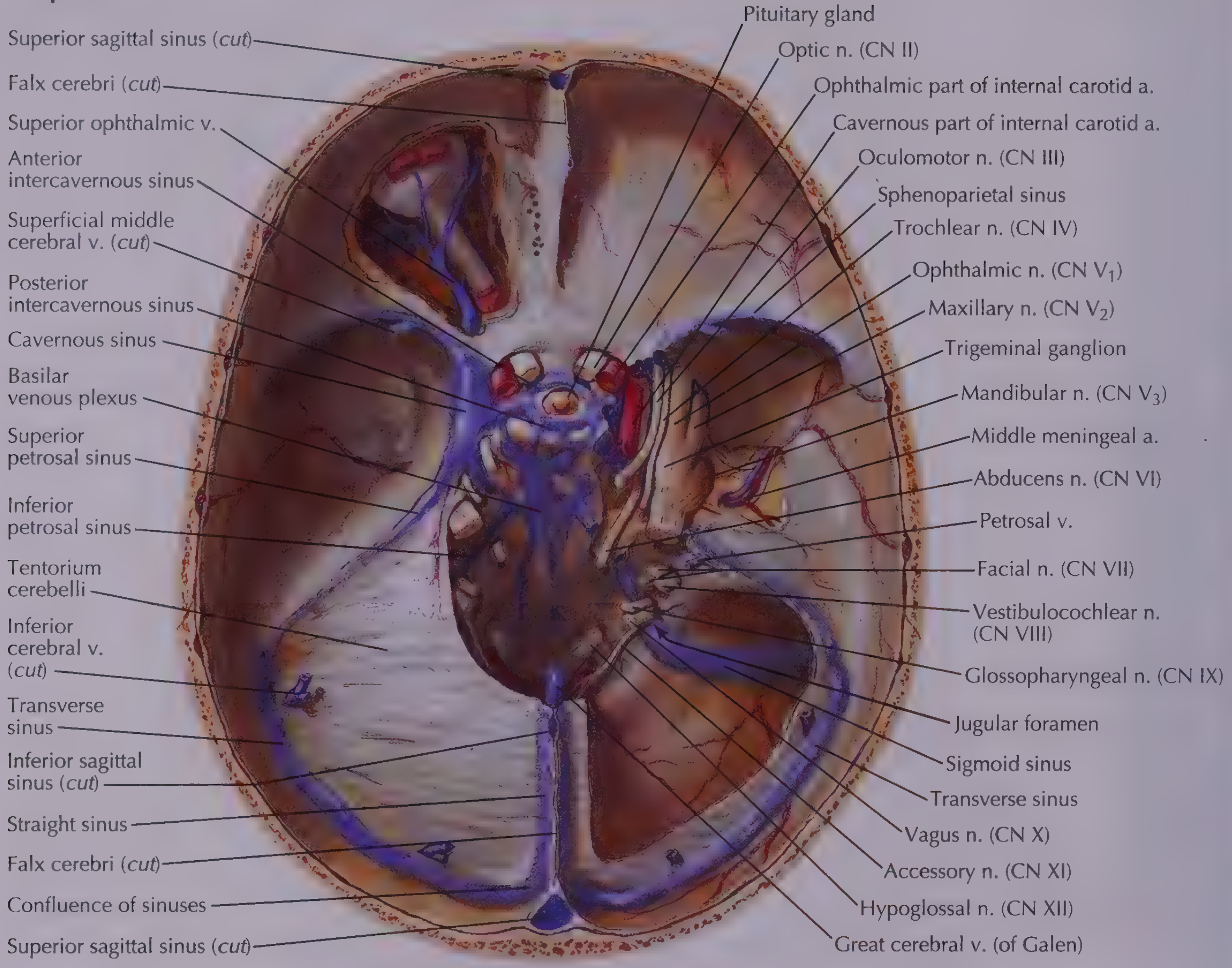
See also Plates 127, 133

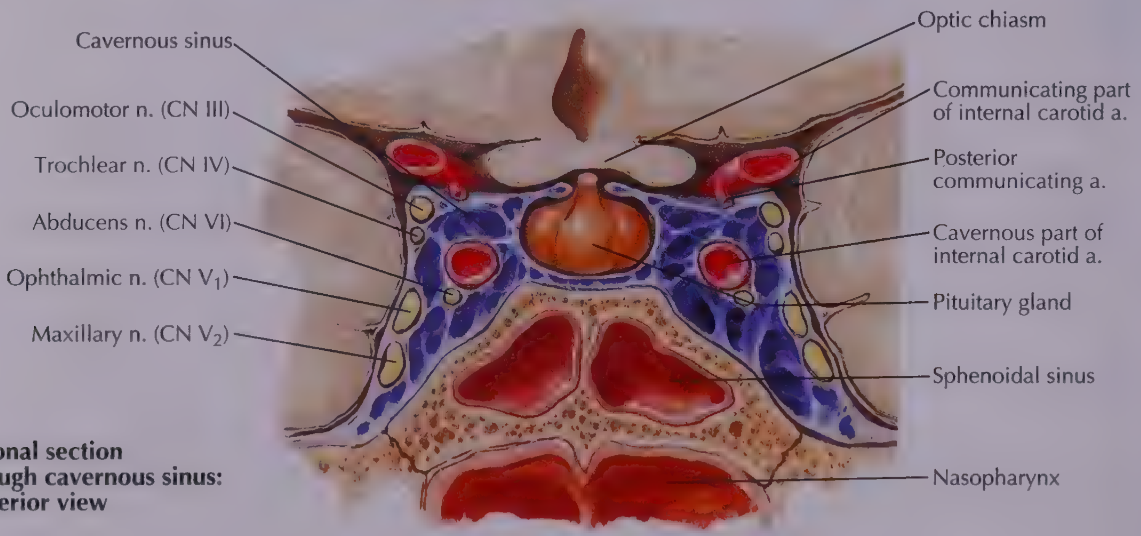

Great cerebral v. (of Galen)
Tentorium cerebelli
Bridging veins
Superior sagittal sinus
Falx cerebri
Superior sagittal sinus
Inferior sagittal sinus
Sphenoparietal sinus
Posterior intercavernous sinus
Straight sinus
Anterior intercavernous sinus
Superior petrosal sinus
Basilar venous plexus
Confluence of sinuses
Inferior petrosal sinus
Falx cerebelli
Jugular fossa
Occipital sinus
Anterior internal vertebral venous plexus
Transverse sinus
Sigmoid sinus
F. Netter M.D.

Dural Venous Sinuses: Cranial Base

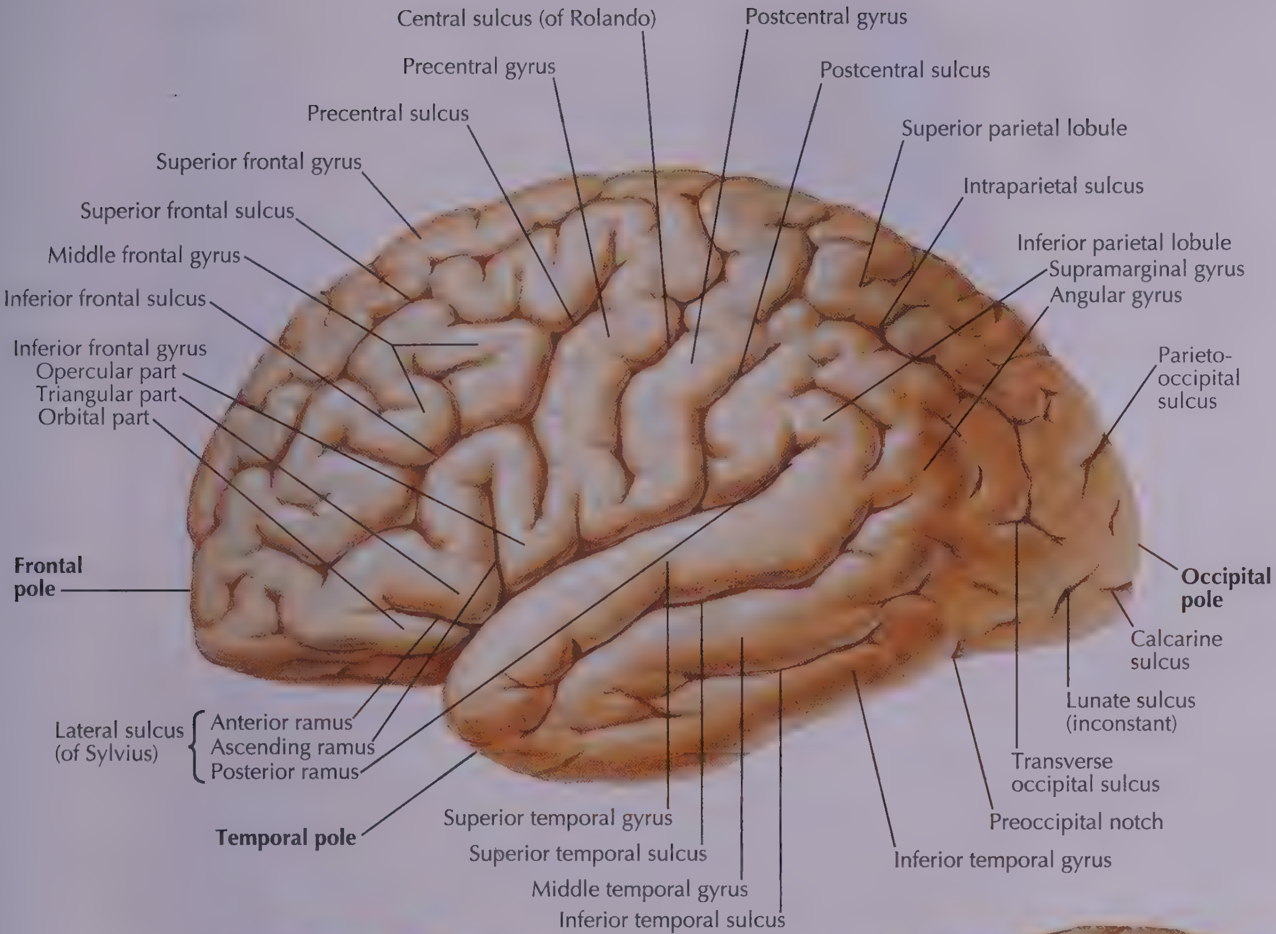
See also Plates 82, 113

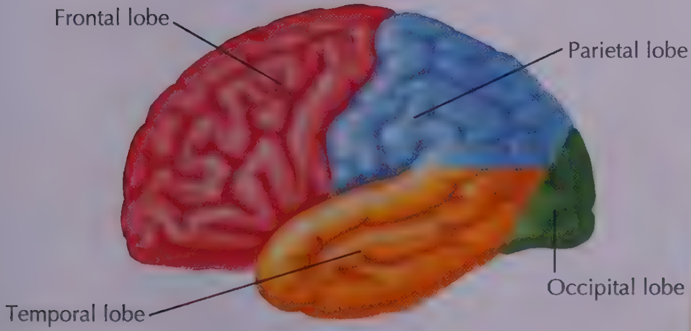
Skull sectioned horizontally: superior view

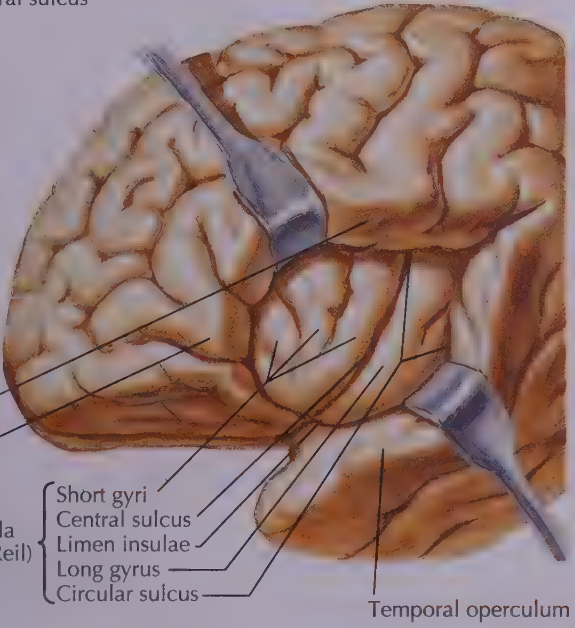

Superior sagittal sinus (*cut*)
Falx cerebri (*cut*)
Superior ophthalmic v.
Anterior intercavernous sinus
Superficial middle cerebral v. (*cut*)
Posterior intercavernous sinus
Cavernous sinus
Basilar venous plexus
Superior petrosal sinus
Inferior petrosal sinus
Tentorium cerebelli
Inferior cerebral v. (*cut*)
Transverse sinus
Inferior sagittal sinus (*cut*)
Straight sinus
Falx cerebri (*cut*)
Confluence of sinuses
Superior sagittal sinus (*cut*)
Pituitary gland
Optic n. (CN II)
Ophthalmic part of internal carotid a.
Cavernous part of internal carotid a.
Oculomotor n. (CN III)
Sphenoparietal sinus
Trochlear n. (CN IV)
Ophthalmic n. (CN V_1)
Maxillary n. (CN V_2)
Trigeminal ganglion
Mandibular n. (CN V_3)
Middle meningeal a.
Abducens n. (CN VI)
Petrosal v.
Facial n. (CN VII)
Vestibulocochlear n. (CN VIII)
Glossopharyngeal n. (CN IX)
Jugular foramen
Sigmoid sinus
Transverse sinus
Vagus n. (CN X)
Accessory n. (CN XI)
Hypoglossal n. (CN XII)
Great cerebral v. (of Galen)


Cavernous sinus
Oculomotor n. (CN III)
Trochlear n. (CN IV)
Abducens n. (CN VI)
Ophthalmic n. (CN V_1)
Maxillary n. (CN V_2)
Optic chiasm
Communicating part of internal carotid a.
Posterior communicating a.
Cavernous part of internal carotid a.
Pituitary gland
Sphenoidal sinus
Nasopharynx

Coronal section through cavernous sinus: posterior view

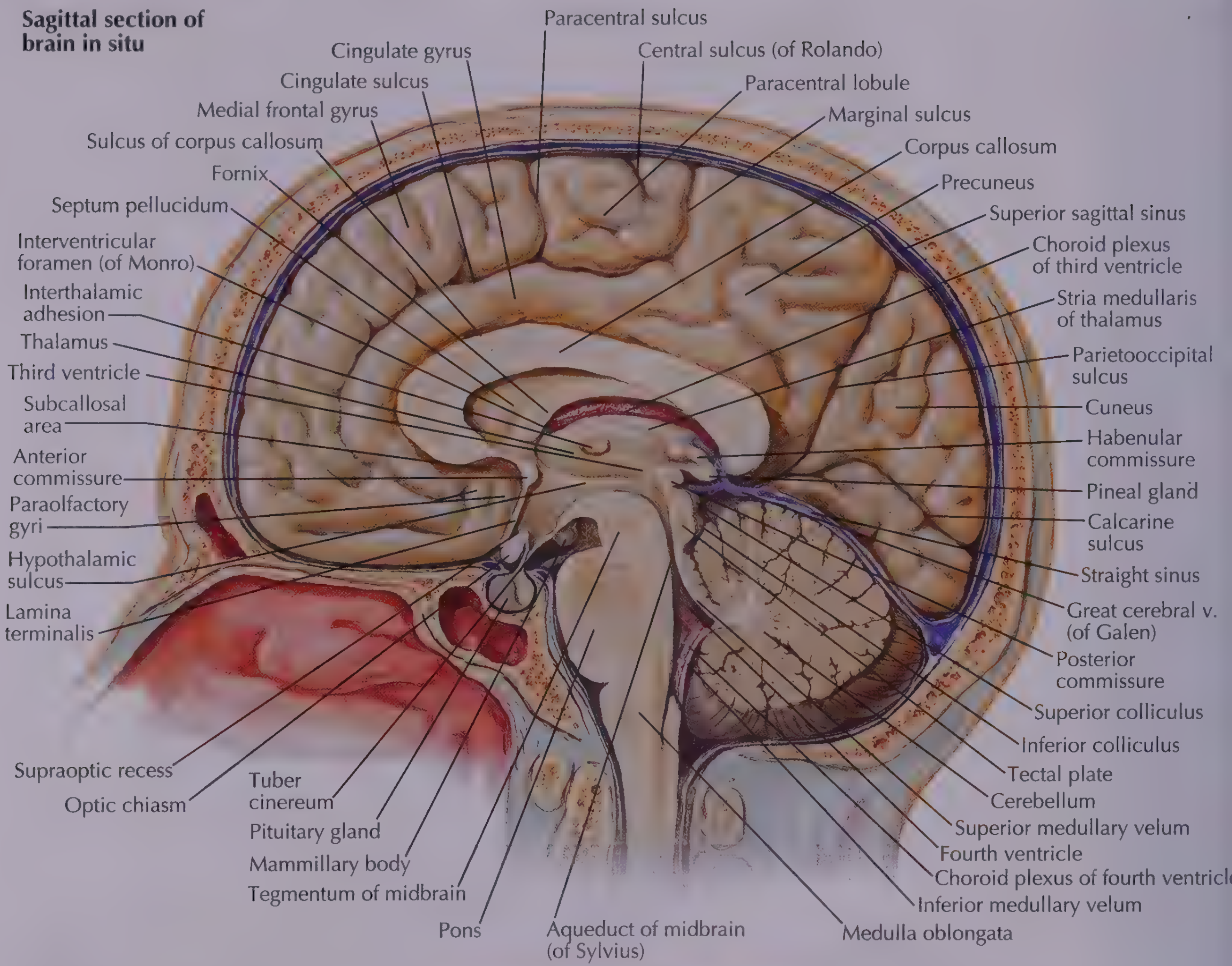

Central sulcus (of Rolando)
Postcentral gyrus
Precentral gyrus
Postcentral sulcus
Precentral sulcus
Superior parietal lobule
Superior frontal gyrus
Intraparietal sulcus
Superior frontal sulcus
Middle frontal gyrus
Inferior parietal lobule
Supramarginal gyrus
Angular gyrus
Inferior frontal sulcus
Inferior frontal gyrus
Opercular part
Triangular part
Orbital part
Parieto-occipital sulcus
Frontal pole
Occipital pole
Calcarine sulcus
Lunate sulcus (inconstant)
Lateral sulcus (of Sylvius)
Anterior ramus
Ascending ramus
Posterior ramus
Transverse occipital sulcus
Temporal pole
Superior temporal gyrus
Superior temporal sulcus
Middle temporal gyrus
Inferior temporal sulcus
Preoccipital notch
Inferior temporal gyrus


Frontal lobe
Parietal lobe
Occipital lobe
Temporal lobe

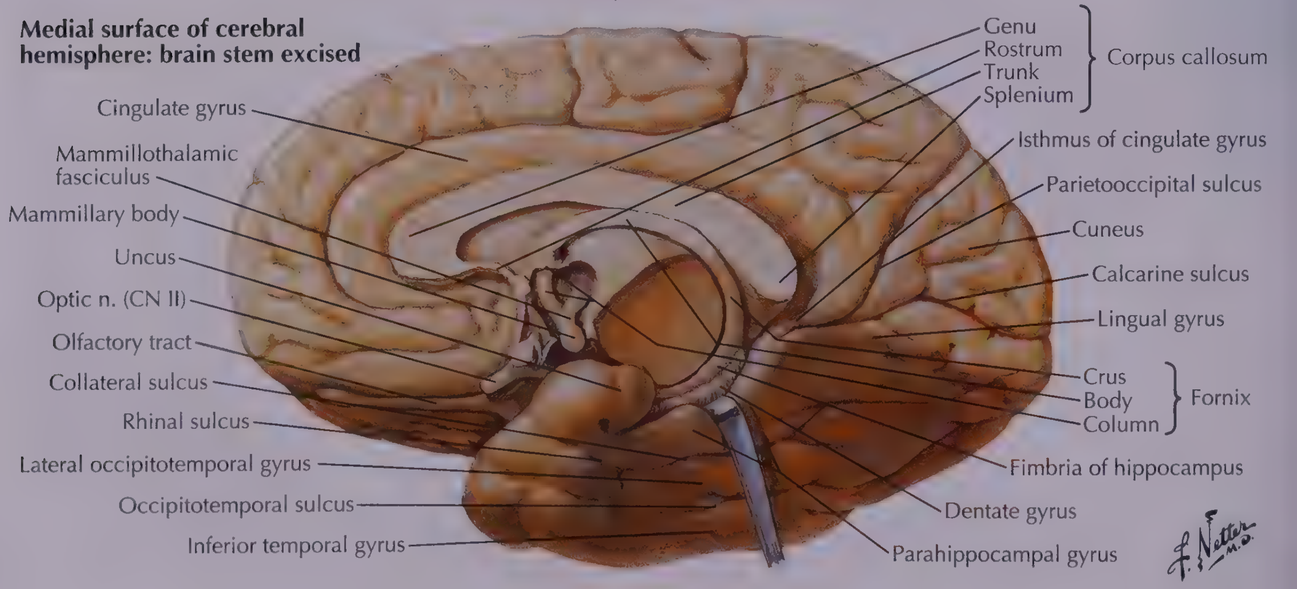

Parietal operculum
Frontal operculum
Insula (of Reil)
Short gyri
Central sulcus
Limen insulae
Long gyrus
Circular sulcus
Temporal operculum

See also Plate 174

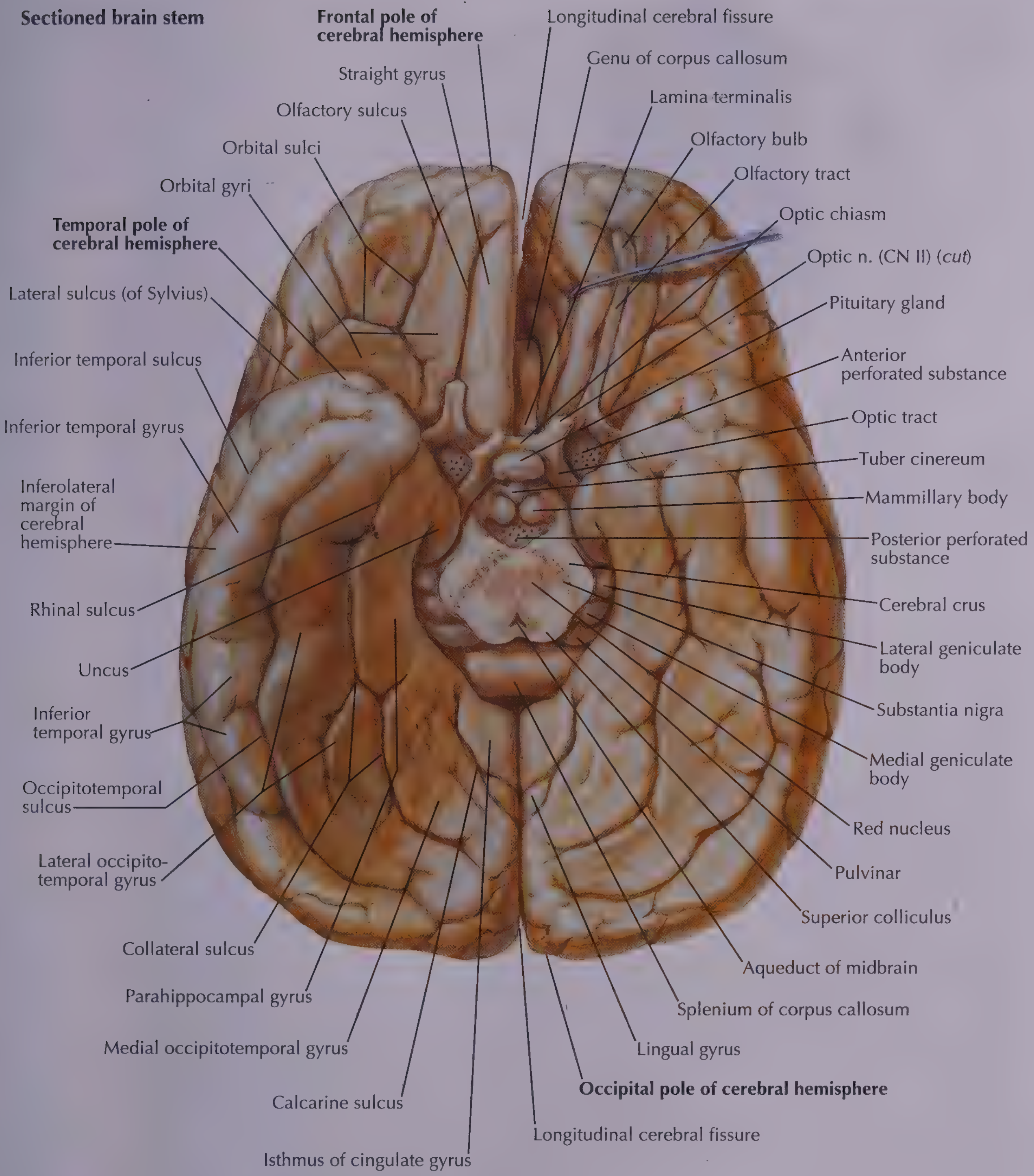
Sagittal section of brain in situ


Paracentral sulcus
Cingulate gyrus
Central sulcus (of Rolando)
Cingulate sulcus
Paracentral lobule
Medial frontal gyrus
Marginal sulcus
Sulcus of corpus callosum
Corpus callosum
Fornix
Precuneus
Septum pellucidum
Superior sagittal sinus
Interventricular foramen (of Monro)
Choroid plexus of third ventricle
Interthalamic adhesion
Stria medullaris of thalamus
Thalamus
Parietooccipital sulcus
Third ventricle
Cuneus
Subcallosal area
Habenular commissure
Anterior commissure
Pineal gland
Paraolfactory gyri
Calcarine sulcus
Hypothalamic sulcus
Straight sinus
Lamina terminalis
Great cerebral v. (of Galen)
Posterior commissure
Superior colliculus
Inferior colliculus
Tectal plate
Supraoptic recess
Tuber cinereum
Cerebellum
Optic chiasm
Superior medullary velum
Pituitary gland
Fourth ventricle
Mammillary body
Choroid plexus of fourth ventricl
Tegmentum of midbrain
Inferior medullary velum
Pons
Aqueduct of midbrain (of Sylvius)
Medulla oblongata

Medial surface of cerebral hemisphere: brain stem excised


Genu
Rostrum
Trunk
Splenium
Corpus callosum
Cingulate gyrus
Isthmus of cingulate gyrus
Mammillothalamic fasciculus
Parietooccipital sulcus
Mammillary body
Cuneus
Uncus
Calcarine sulcus
Optic n. (CN II)
Lingual gyrus
Olfactory tract
Crus
Collateral sulcus
Body
Fornix
Rhinal sulcus
Column
Fimbria of hippocampus
Lateral occipitotemporal gyrus
Occipitotemporal sulcus
Dentate gyrus
Inferior temporal gyrus
Parahippocampal gyrus

See also Plate 133


Sectioned brain stem
Frontal pole of cerebral hemisphere
Straight gyrus
Olfactory sulcus
Orbital sulci
Orbital gyri
Temporal pole of cerebral hemisphere
Lateral sulcus (of Sylvius)
Inferior temporal sulcus
Inferior temporal gyrus
Inferolateral margin of cerebral hemisphere
Rhinal sulcus
Uncus
Inferior temporal gyrus
Occipitotemporal sulcus
Lateral occipito-temporal gyrus
Collateral sulcus
Parahippocampal gyrus
Medial occipitotemporal gyrus
Calcarine sulcus
Isthmus of cingulate gyrus
Longitudinal cerebral fissure
Genu of corpus callosum
Lamina terminalis
Olfactory bulb
Olfactory tract
Optic chiasm
Optic n. (CN II) (cut)
Pituitary gland
Anterior perforated substance
Optic tract
Tuber cinereum
Mammillary body
Posterior perforated substance
Cerebral crus
Lateral geniculate body
Substantia nigra
Medial geniculate body
Red nucleus
Pulvinar
Superior colliculus
Aqueduct of midbrain
Splenium of corpus callosum
Lingual gyrus
Occipital pole of cerebral hemisphere
Longitudinal cerebral fissure

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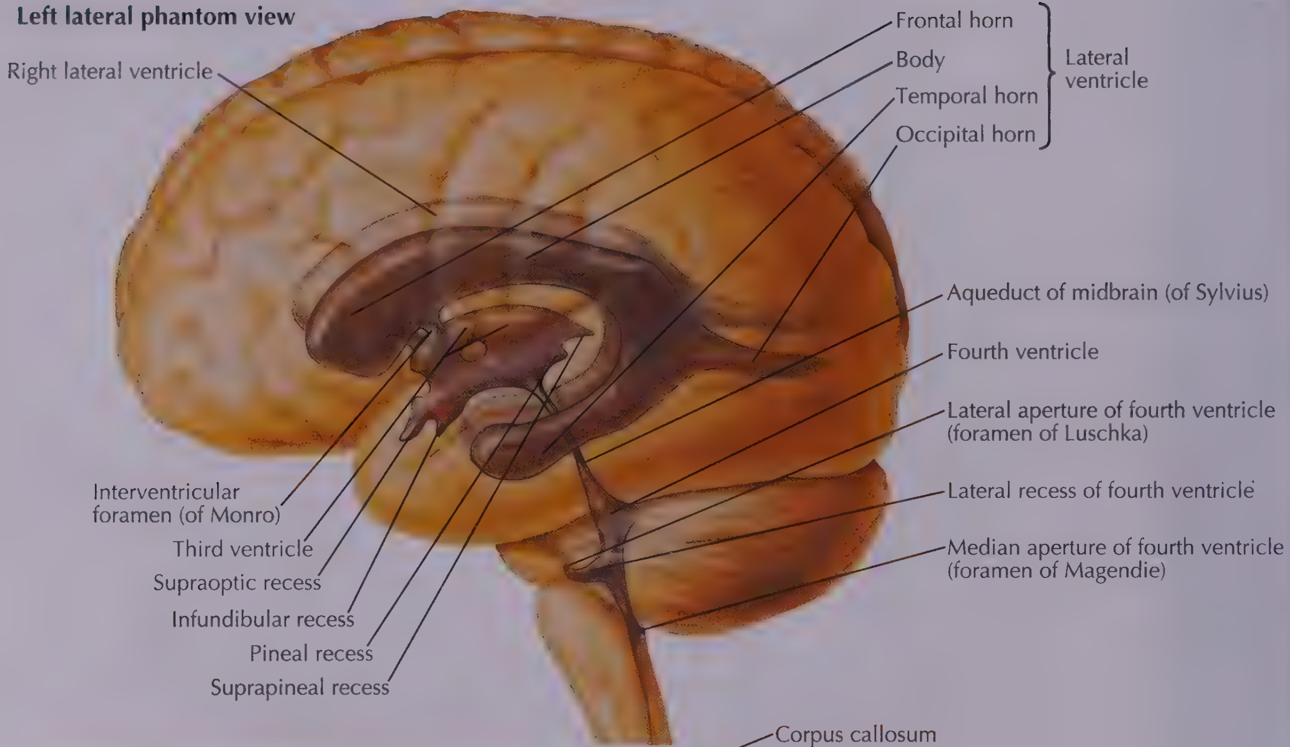
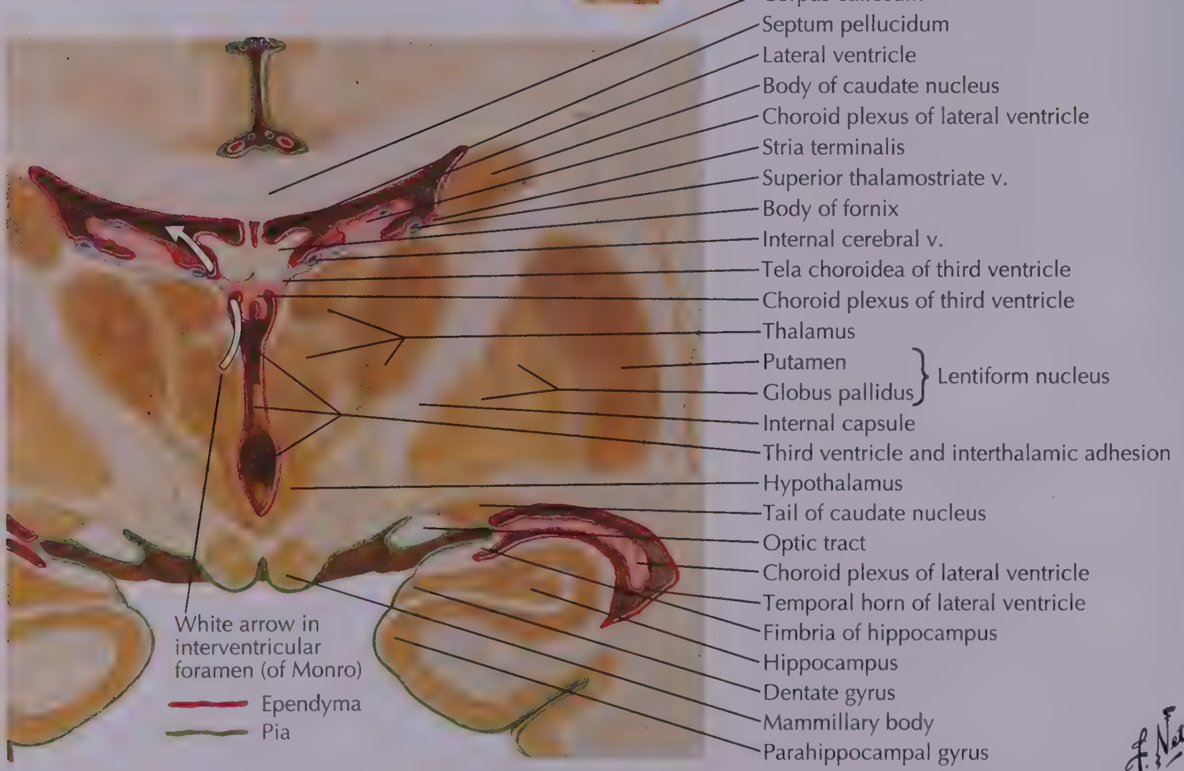
Ventricles of Brain

Left lateral phantom view


Right lateral ventricle
Frontal horn
Body
Temporal horn
Occipital horn
Lateral ventricle
Aqueduct of midbrain (of Sylvius)
Fourth ventricle
Lateral aperture of fourth ventricle (foramen of Luschka)
Lateral recess of fourth ventricle
Median aperture of fourth ventricle (foramen of Magendie)
Interventricular foramen (of Monro)
Third ventricle
Supraoptic recess
Infundibular recess
Pineal recess
Suprapineal recess


Corpus callosum
Septum pellucidum
Lateral ventricle
Body of caudate nucleus
Choroid plexus of lateral ventricle
Stria terminalis
Superior thalamostriate v.
Body of fornix
Internal cerebral v.
Tela choroidea of third ventricle
Choroid plexus of third ventricle
Thalamus
Putamen
Globus pallidus
Lentiform nucleus
Internal capsule
Third ventricle and interthalamic adhesion
Hypothalamus
Tail of caudate nucleus
Optic tract
Choroid plexus of lateral ventricle
Temporal horn of lateral ventricle
Fimbria of hippocampus
Hippocampus
Dentate gyrus
Mammillary body
Parahippocampal gyrus
White arrow in interventricular foramen (of Monro)
Ependyma
Pia

Coronal section of brain: posterior view

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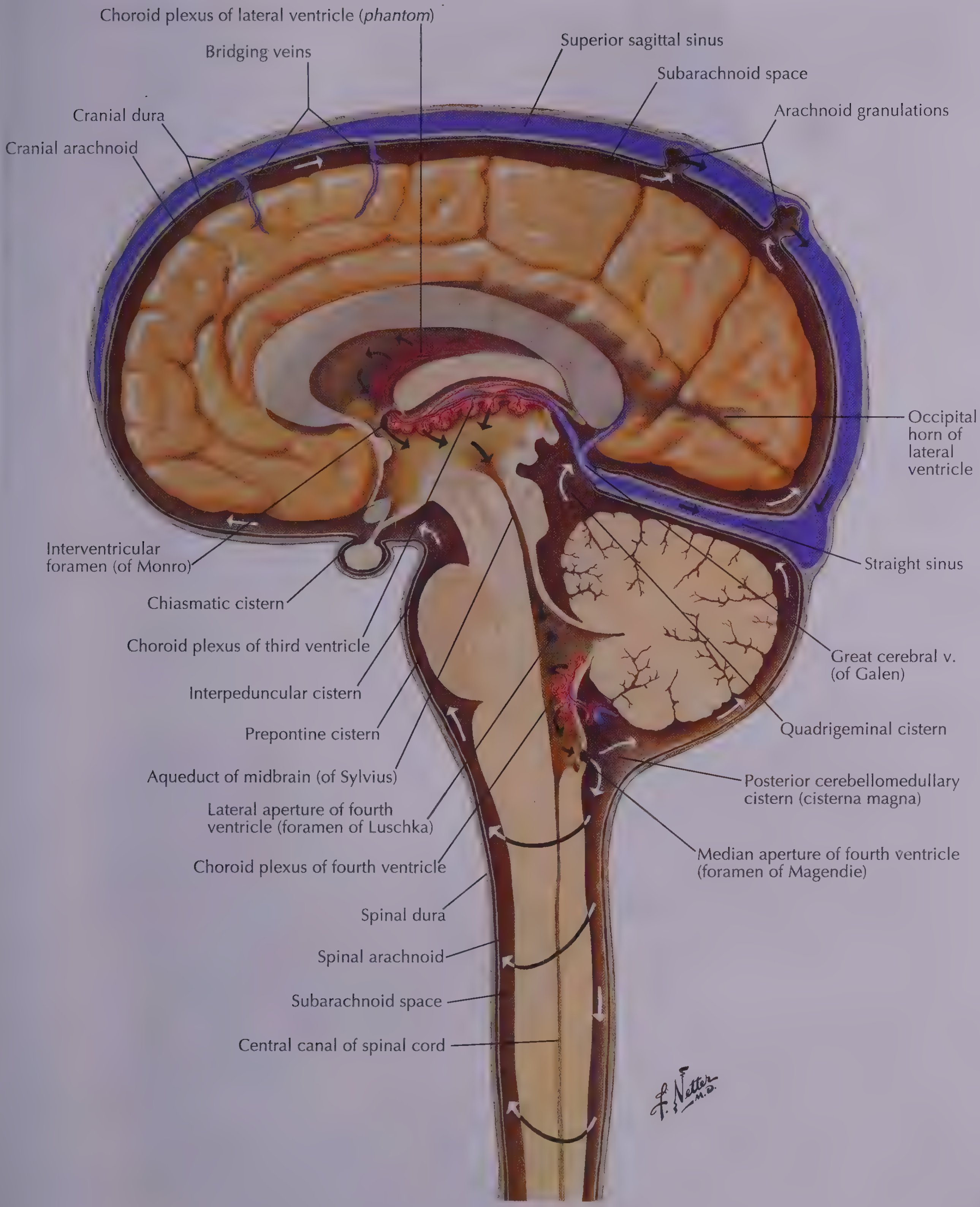
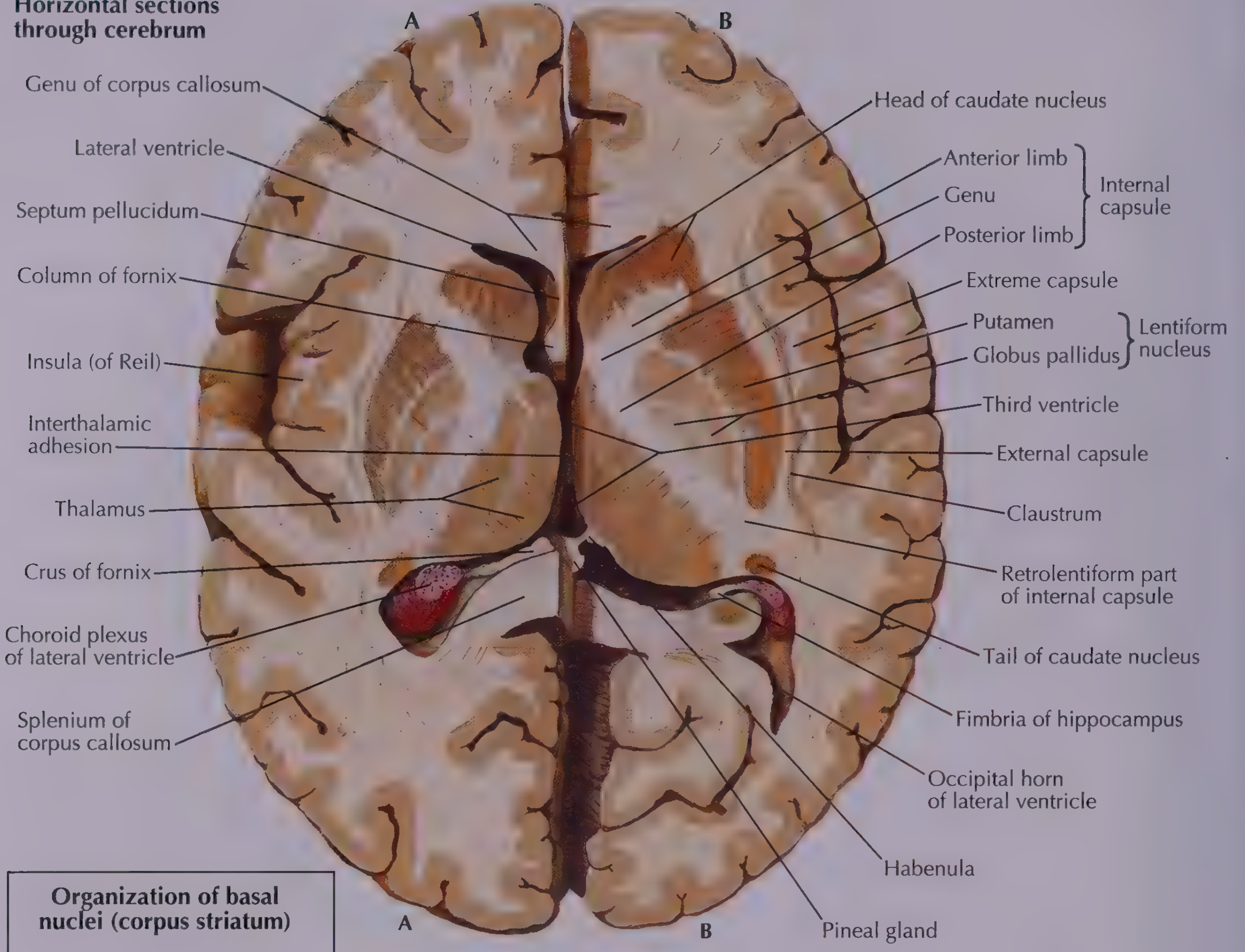
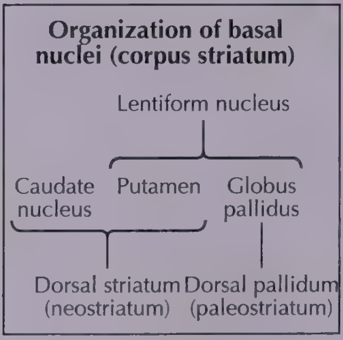
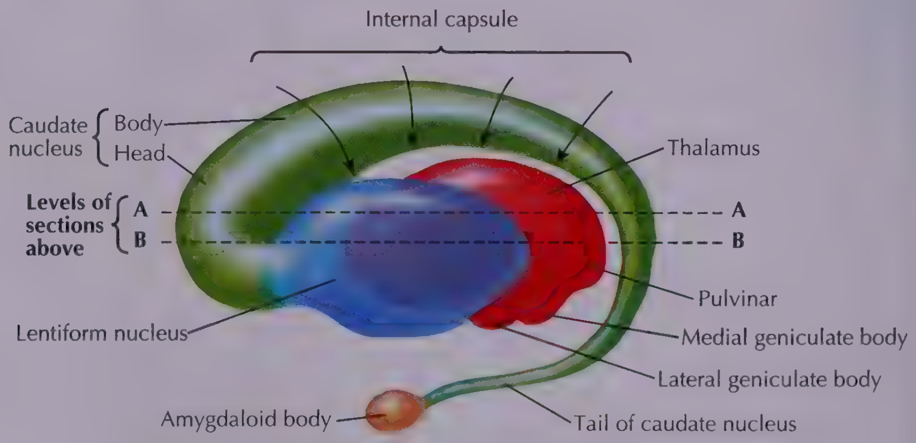
See also Plates 135, 172, 173


Choroid plexus of lateral ventricle (*phantom*)
Bridging veins
Cranial dura
Cranial arachnoid
Superior sagittal sinus
Subarachnoid space
Arachnoid granulations
Occipital horn of lateral ventricle
Straight sinus
Great cerebral v. (of Galen)
Quadrigeminal cistern
Posterior cerebellomedullary cistern (cisterna magna)
Median aperture of fourth ventricle (foramen of Magendie)
Interventricular foramen (of Monro)
Chiasmatic cistern
Choroid plexus of third ventricle
Interpeduncular cistern
Prepontine cistern
Aqueduct of midbrain (of Sylvius)
Lateral aperture of fourth ventricle (foramen of Luschka)
Choroid plexus of fourth ventricle
Spinal dura
Spinal arachnoid
Subarachnoid space
Central canal of spinal cord
F. Netter M.D.

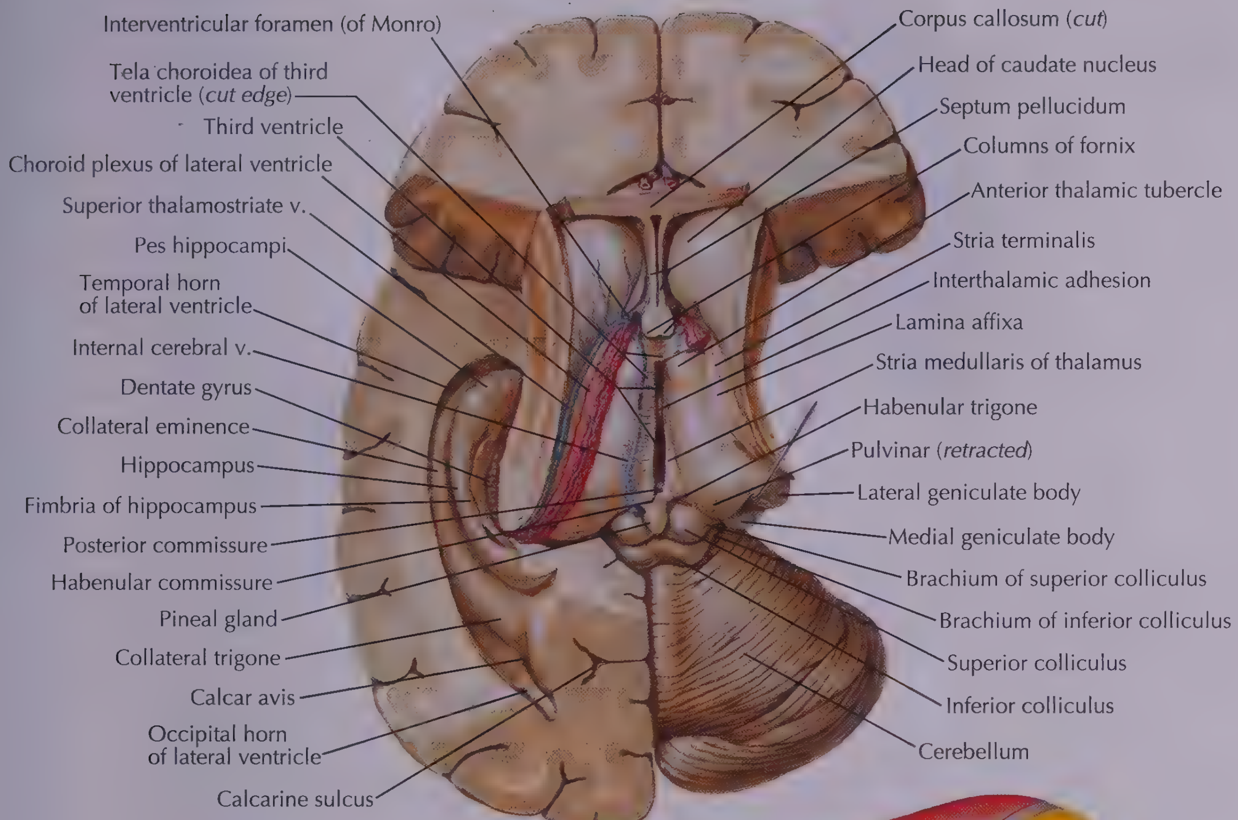
Horizontal sections through cerebrum

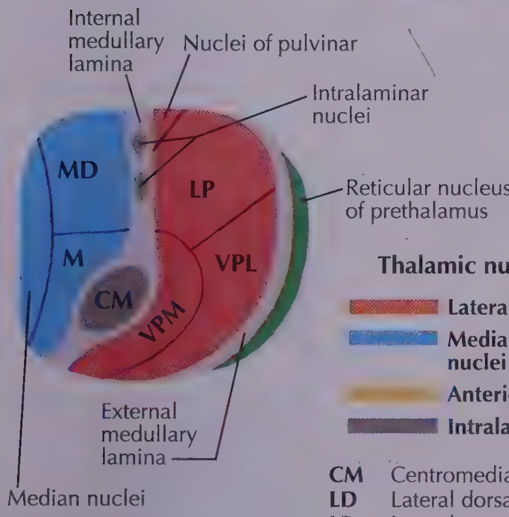

A
B
Genu of corpus callosum
Lateral ventricle
Septum pellucidum
Column of fornix
Insula (of Reil)
Interthalamic adhesion
Thalamus
Crus of fornix
Choroid plexus of lateral ventricle
Splenium of corpus callosum
Head of caudate nucleus
Anterior limb
Genu
Posterior limb
Internal capsule
Extreme capsule
Putamen
Globus pallidus
Lentiform nucleus
Third ventricle
External capsule
Claustrum
Retrolentiform part of internal capsule
Tail of caudate nucleus
Fimbria of hippocampus
Occipital horn of lateral ventricle
Habenula
Pineal gland
A
B


Organization of basal nuclei (corpus striatum)
Lentiform nucleus
Caudate nucleus
Putamen
Globus pallidus
Dorsal striatum (neostriatum)
Dorsal pallidum (paleostriatum)


Internal capsule
Caudate nucleus
Body
Head
Thalamus
Levels of sections above
A
B
A
B
Pulvinar
Medial geniculate body
Lateral geniculate body
Lentiform nucleus
Amygdaloid body
Tail of caudate nucleus

Interrelationship of thalamus, lentiform nucleus, caudate nucleus, and amygdaloid body (schema): left lateral view


Interventricular foramen (of Monro)
Tela choroidea of third ventricle (*cut edge*)
Third ventricle
Choroid plexus of lateral ventricle
Superior thalamostriate v.
Pes hippocampi
Temporal horn of lateral ventricle
Internal cerebral v.
Dentate gyrus
Collateral eminence
Hippocampus
Fimbria of hippocampus
Posterior commissure
Habenular commissure
Pineal gland
Collateral trigone
Calcar avis
Occipital horn of lateral ventricle
Calcarine sulcus
Corpus callosum (*cut*)
Head of caudate nucleus
Septum pellucidum
Columns of fornix
Anterior thalamic tubercle
Stria terminalis
Interthalamic adhesion
Lamina affixa
Stria medullaris of thalamus
Habenular trigone
Pulvinar (*retracted*)
Lateral geniculate body
Medial geniculate body
Brachium of superior colliculus
Brachium of inferior colliculus
Superior colliculus
Inferior colliculus
Cerebellum

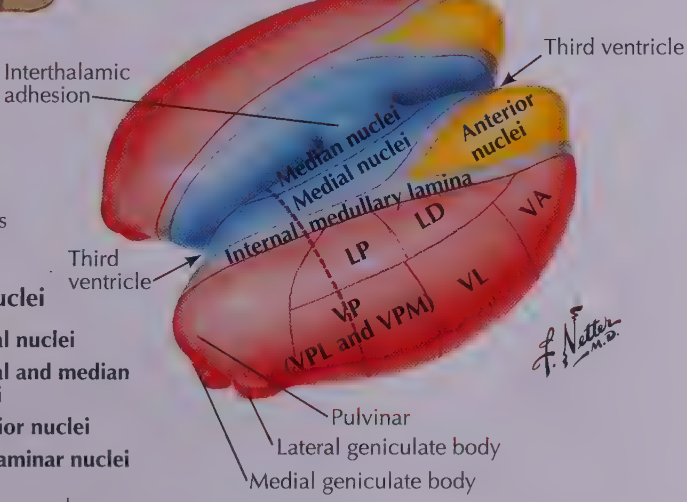

Internal medullary lamina
Nuclei of pulvinar
Intralaminar nuclei
MD
LP
M
VPL
CM
VPM
Reticular nucleus of prethalamus
External medullary lamina
Median nuclei

Schematic section through thalamus
(at level of broken line shown in figure at right)

Thalamic nuclei

🟥 **Lateral nuclei**
🟦 **Medial and median nuclei**
🟨 **Anterior nuclei**
▨ **Intralaminar nuclei**

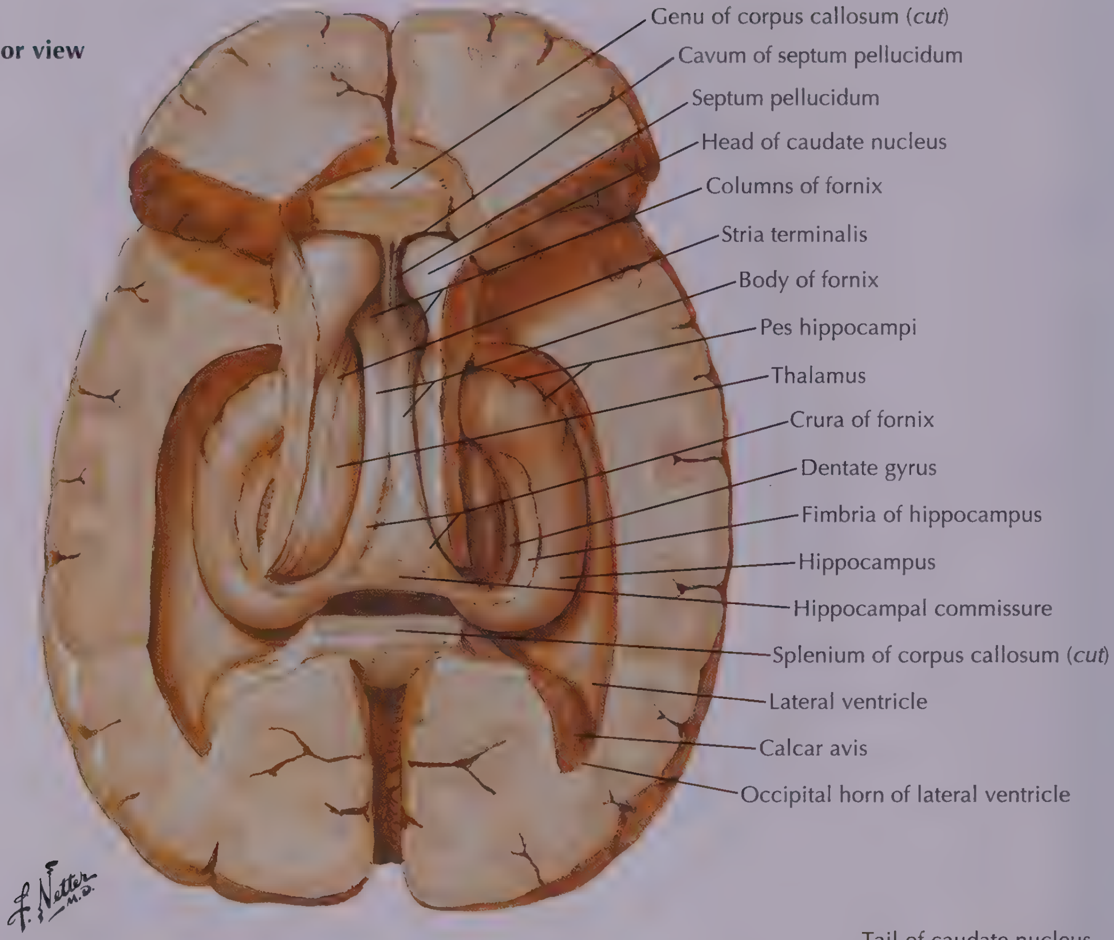
CM	Centromedian nucleus
LD	Lateral dorsal nucleus
LP	Lateral posterior nucleus
M	Medial nuclei
MD	Medial dorsal nucleus
VA	Ventral anterior nucleus
VL	Ventral lateral nuclei
VP	Ventral posterior nuclei
VPL	Ventral posterolateral nucleus
VPM	Ventral posteromedial nucleus

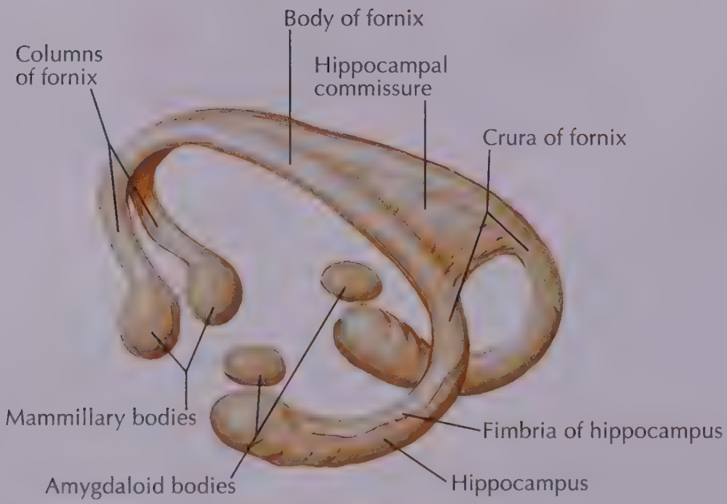

Interthalamic adhesion
Third ventricle
Median nuclei
Medial nuclei
Anterior nuclei
Internal medullary lamina
LD
VA
LP
VL
VP
(VPL and VPM)
Third ventricle
Pulvinar
Lateral geniculate body
Medial geniculate body
F. Netter M.D.

Schematic representation of thalamus
(external medullary lamina and reticular nucleus removed)

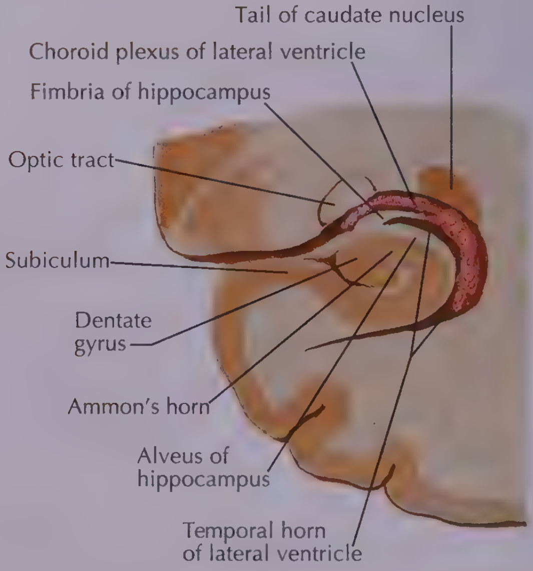
Hippocampus and Fornix

Superior view

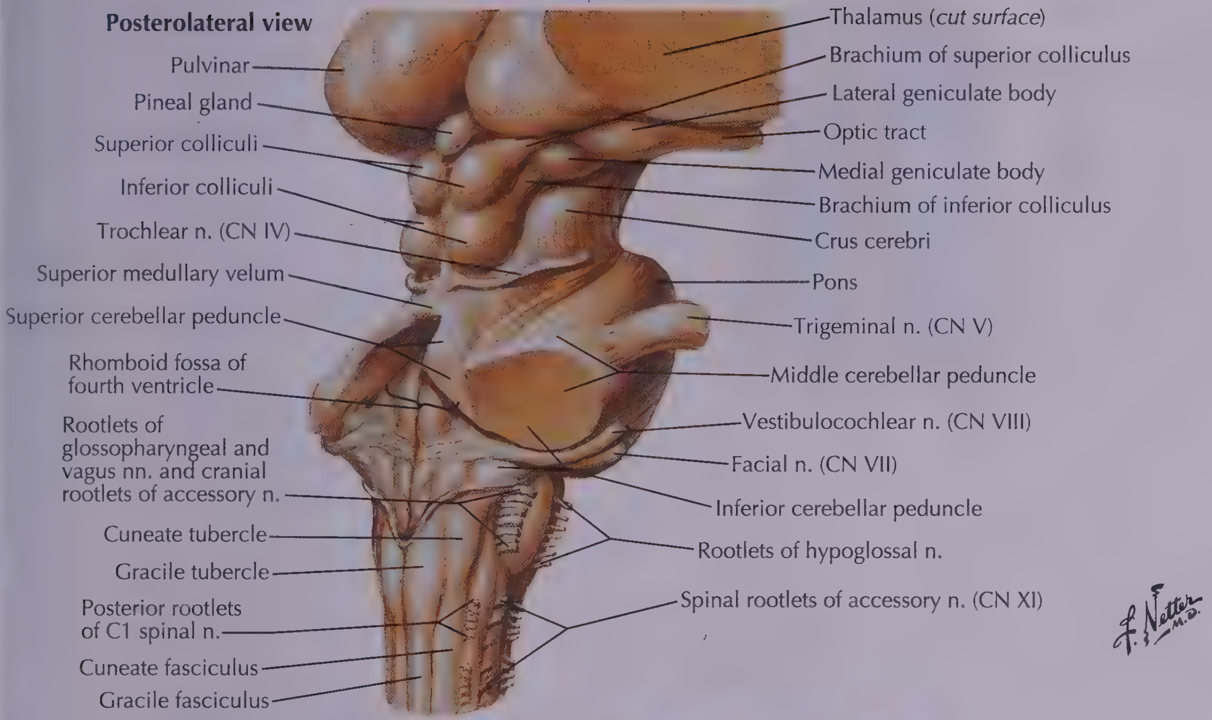

Genu of corpus callosum (*cut*)
Cavum of septum pellucidum
Septum pellucidum
Head of caudate nucleus
Columns of fornix
Stria terminalis
Body of fornix
Pes hippocampi
Thalamus
Crura of fornix
Dentate gyrus
Fimbria of hippocampus
Hippocampus
Hippocampal commissure
Splenium of corpus callosum (*cut*)
Lateral ventricle
Calcar avis
Occipital horn of lateral ventricle
F. Netter M.D.


Body of fornix
Columns of fornix
Hippocampal commissure
Crura of fornix
Mammillary bodies
Fimbria of hippocampus
Amygdaloid bodies
Hippocampus

Fornix: schema

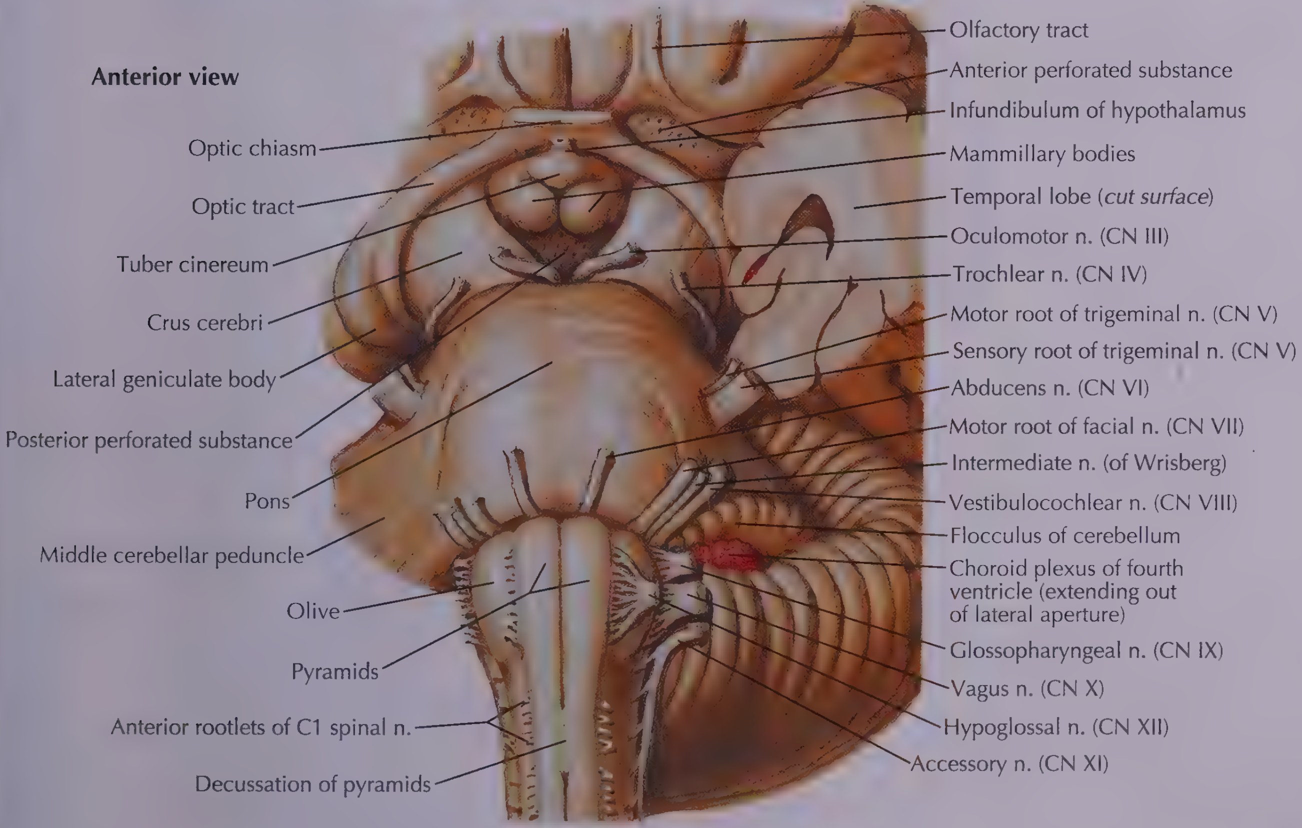

Tail of caudate nucleus
Choroid plexus of lateral ventricle
Fimbria of hippocampus
Optic tract
Subiculum
Dentate gyrus
Ammon's horn
Alveus of hippocampus
Temporal horn of lateral ventricle

Coronal section: posterior view



Posterolateral view

Pulvinar
Pineal gland
Superior colliculi
Inferior colliculi
Trochlear n. (CN IV)
Superior medullary velum
Superior cerebellar peduncle
Rhomboid fossa of fourth ventricle
Rootlets of glossopharyngeal and vagus nn. and cranial rootlets of accessory n.
Cuneate tubercle
Gracile tubercle
Posterior rootlets of C1 spinal n.
Cuneate fasciculus
Gracile fasciculus
Thalamus (*cut surface*)
Brachium of superior colliculus
Lateral geniculate body
Optic tract
Medial geniculate body
Brachium of inferior colliculus
Crus cerebri
Pons
Trigeminal n. (CN V)
Middle cerebellar peduncle
Vestibulocochlear n. (CN VIII)
Facial n. (CN VII)
Inferior cerebellar peduncle
Rootlets of hypoglossal n.
Spinal rootlets of accessory n. (CN XI)

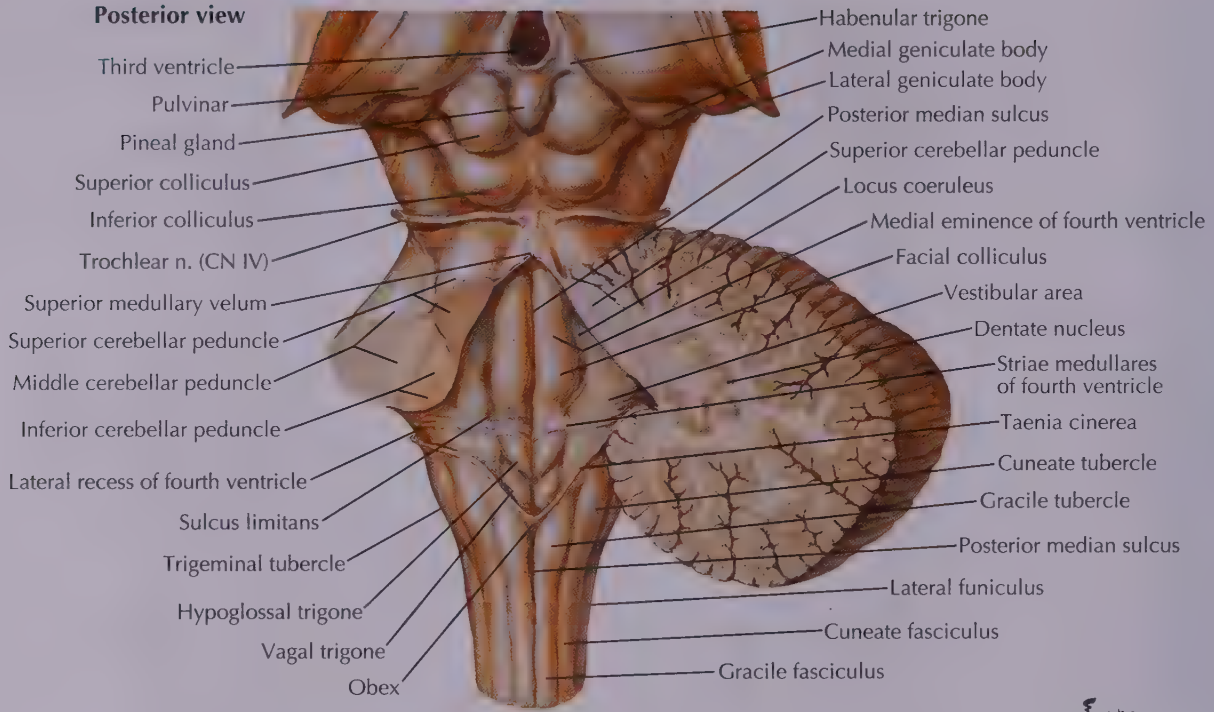


Anterior view

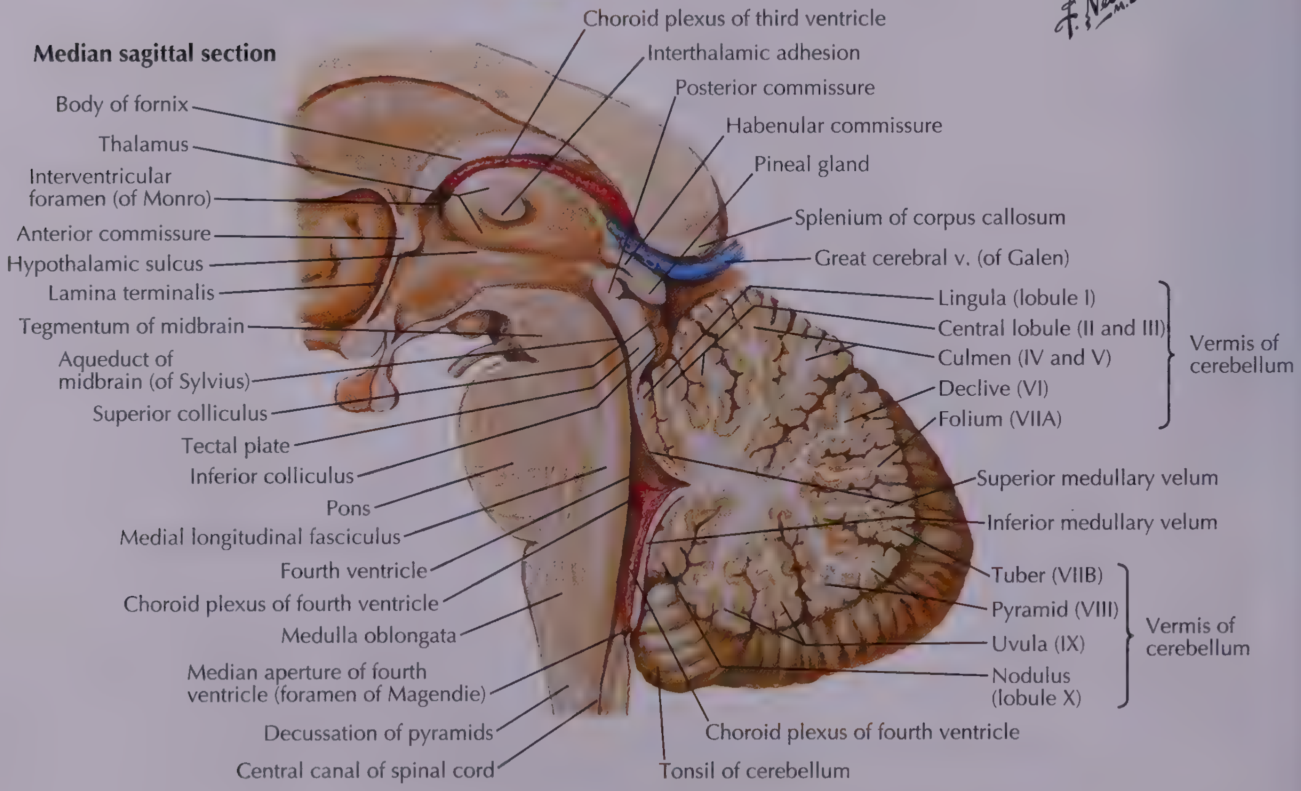
Optic chiasm
Optic tract
Tuber cinereum
Crus cerebri
Lateral geniculate body
Posterior perforated substance
Pons
Middle cerebellar peduncle
Olive
Pyramids
Anterior rootlets of C1 spinal n.
Decussation of pyramids
Olfactory tract
Anterior perforated substance
Infundibulum of hypothalamus
Mammillary bodies
Temporal lobe (*cut surface*)
Oculomotor n. (CN III)
Trochlear n. (CN IV)
Motor root of trigeminal n. (CN V)
Sensory root of trigeminal n. (CN V)
Abducens n. (CN VI)
Motor root of facial n. (CN VII)
Intermediate n. (of Wrisberg)
Vestibulocochlear n. (CN VIII)
Flocculus of cerebellum
Choroid plexus of fourth ventricle (extending out of lateral aperture)
Glossopharyngeal n. (CN IX)
Vagus n. (CN X)
Hypoglossal n. (CN XII)
Accessory n. (CN XI)

Ventricles and Cerebellum

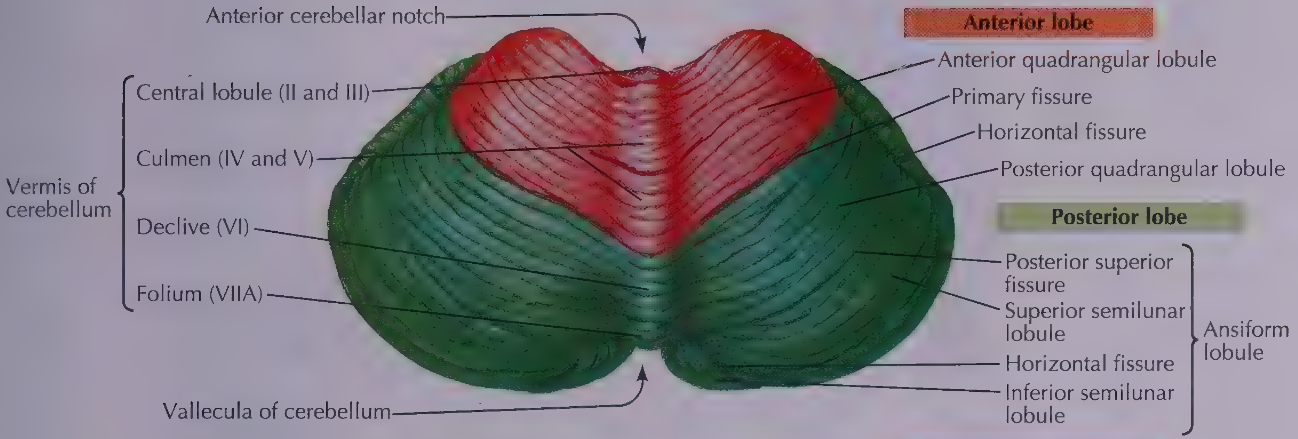
Posterior view


Third ventricle
Pulvinar
Pineal gland
Superior colliculus
Inferior colliculus
Trochlear n. (CN IV)
Superior medullary velum
Superior cerebellar peduncle
Middle cerebellar peduncle
Inferior cerebellar peduncle
Lateral recess of fourth ventricle
Sulcus limitans
Trigeminal tubercle
Hypoglossal trigone
Vagal trigone
Obex
Habenular trigone
Medial geniculate body
Lateral geniculate body
Posterior median sulcus
Superior cerebellar peduncle
Locus coeruleus
Medial eminence of fourth ventricle
Facial colliculus
Vestibular area
Dentate nucleus
Striae medullares of fourth ventricle
Taenia cinerea
Cuneate tubercle
Gracile tubercle
Posterior median sulcus
Lateral funiculus
Cuneate fasciculus
Gracile fasciculus

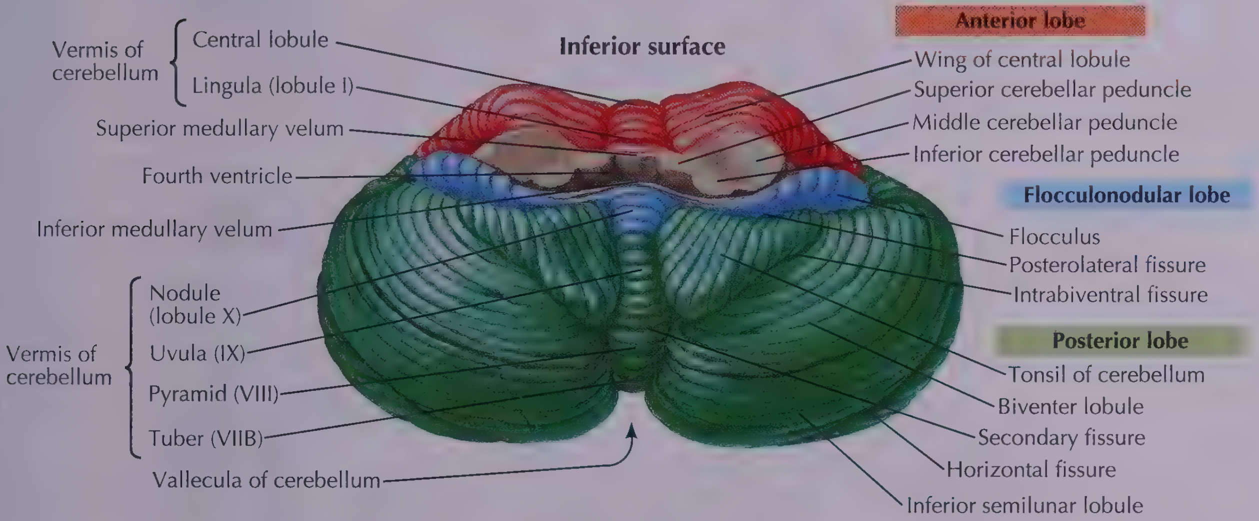
Median sagittal section

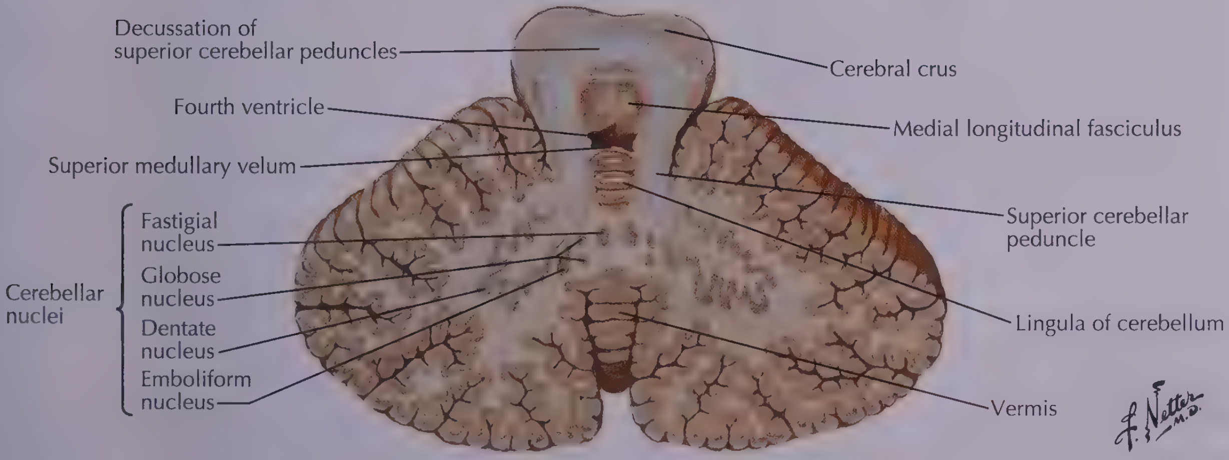

Choroid plexus of third ventricle
Interthalamic adhesion
Posterior commissure
Habenular commissure
Pineal gland
Splenium of corpus callosum
Great cerebral v. (of Galen)
Body of fornix
Thalamus
Interventricular foramen (of Monro)
Anterior commissure
Hypothalamic sulcus
Lamina terminalis
Tegmentum of midbrain
Aqueduct of midbrain (of Sylvius)
Superior colliculus
Tectal plate
Inferior colliculus
Pons
Medial longitudinal fasciculus
Fourth ventricle
Choroid plexus of fourth ventricle
Medulla oblongata
Median aperture of fourth ventricle (foramen of Magendie)
Decussation of pyramids
Central canal of spinal cord
Lingula (lobule I)
Central lobule (II and III)
Culmen (IV and V)
Declive (VI)
Folium (VIIA)
Vermis of cerebellum
Superior medullary velum
Inferior medullary velum
Tuber (VIIB)
Pyramid (VIII)
Uvula (IX)
Nodulus (lobule X)
Vermis of cerebellum
Choroid plexus of fourth ventricle
Tonsil of cerebellum

Superior surface


Anterior cerebellar notch
Central lobule (II and III)
Culmen (IV and V)
Declive (VI)
Folium (VIIA)
Vermis of cerebellum
Vallecula of cerebellum
Anterior lobe
Anterior quadrangular lobule
Primary fissure
Horizontal fissure
Posterior quadrangular lobule
Posterior lobe
Posterior superior fissure
Superior semilunar lobule
Horizontal fissure
Inferior semilunar lobule
Ansiform lobule

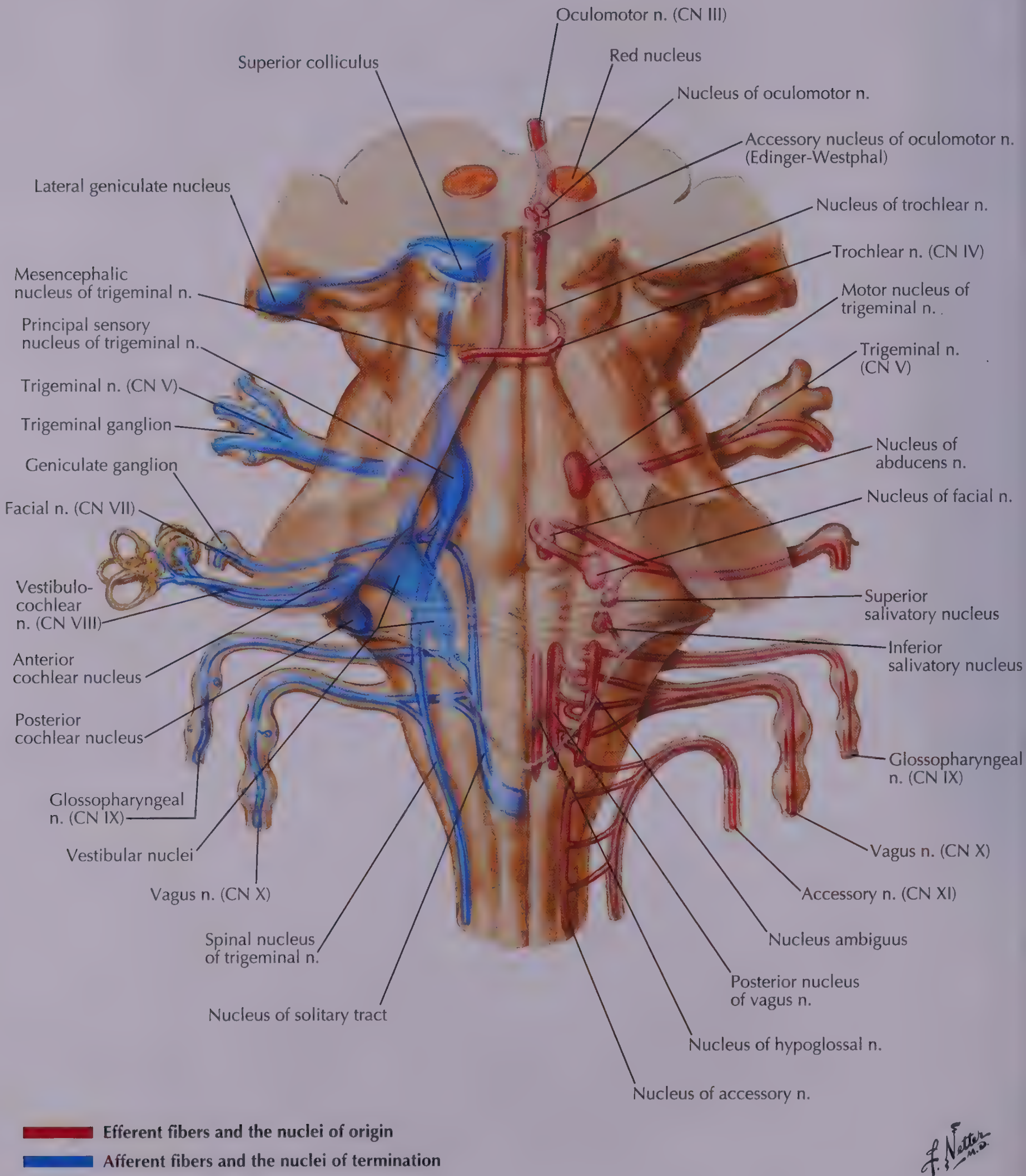
Inferior surface


Vermis of cerebellum
Central lobule
Lingula (lobule I)
Superior medullary velum
Fourth ventricle
Inferior medullary velum
Vermis of cerebellum
Nodule (lobule X)
Uvula (IX)
Pyramid (VIII)
Tuber (VIIB)
Vallecula of cerebellum
Anterior lobe
Wing of central lobule
Superior cerebellar peduncle
Middle cerebellar peduncle
Inferior cerebellar peduncle
Flocculonodular lobe
Flocculus
Posterolateral fissure
Intrabiventral fissure
Posterior lobe
Tonsil of cerebellum
Biventer lobule
Secondary fissure
Horizontal fissure
Inferior semilunar lobule

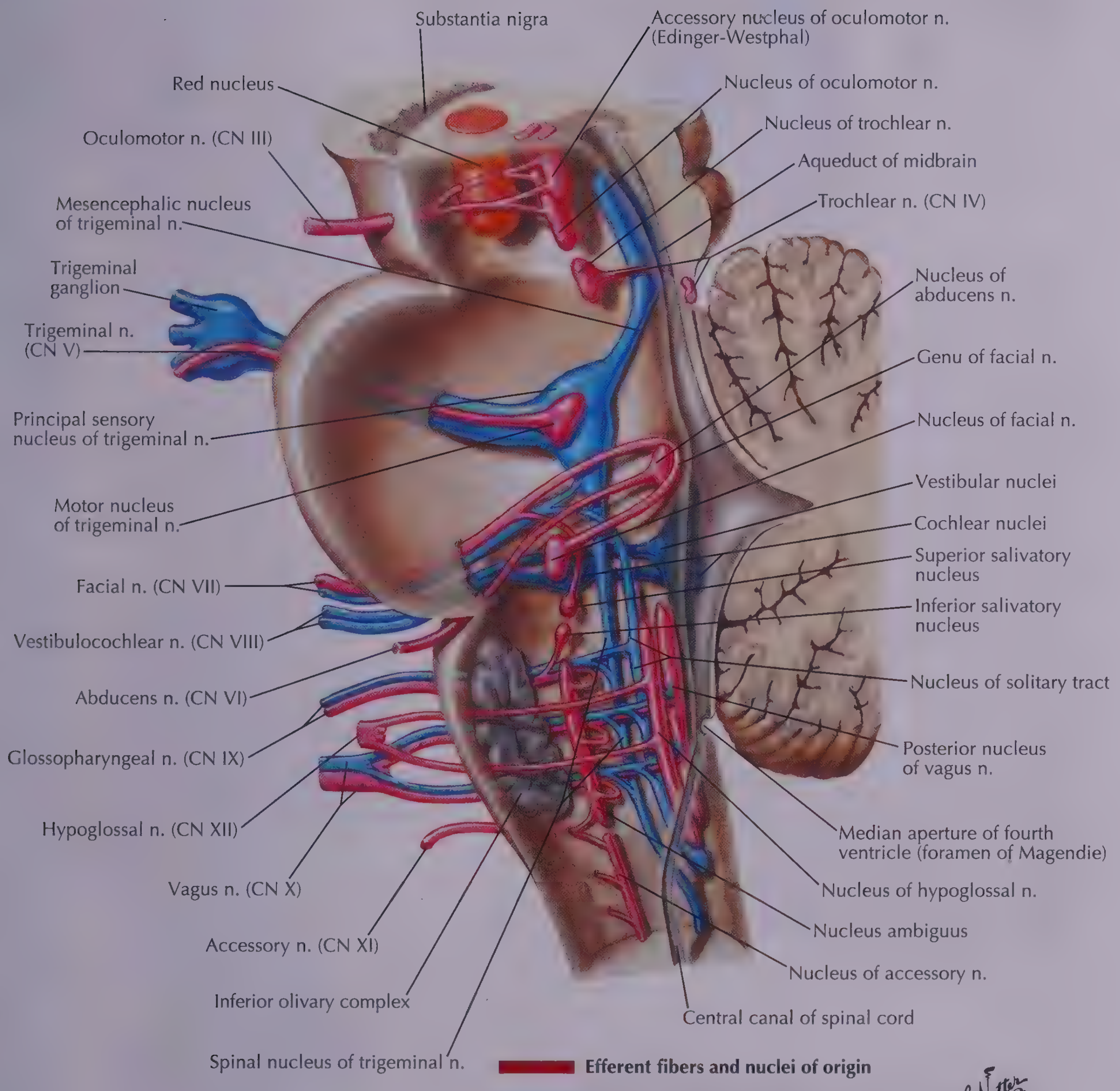

Decussation of superior cerebellar peduncles
Fourth ventricle
Superior medullary velum
Cerebellar nuclei
Fastigial nucleus
Globose nucleus
Dentate nucleus
Emboliform nucleus
Cerebral crus
Medial longitudinal fasciculus
Superior cerebellar peduncle
Lingula of cerebellum
Vermis
F. Netter M.D.

Section in plane of superior cerebellar peduncle

Cranial Nerve Nuclei in Brain Stem: Schema (Posterior View)


Oculomotor n. (CN III)
Red nucleus
Nucleus of oculomotor n.
Accessory nucleus of oculomotor n. (Edinger-Westphal)
Nucleus of trochlear n.
Trochlear n. (CN IV)
Motor nucleus of trigeminal n.
Trigeminal n. (CN V)
Nucleus of abducens n.
Nucleus of facial n.
Superior salivatory nucleus
Inferior salivatory nucleus
Glossopharyngeal n. (CN IX)
Vagus n. (CN X)
Accessory n. (CN XI)
Nucleus ambiguus
Posterior nucleus of vagus n.
Nucleus of hypoglossal n.
Nucleus of accessory n.
Superior colliculus
Lateral geniculate nucleus
Mesencephalic nucleus of trigeminal n.
Principal sensory nucleus of trigeminal n.
Trigeminal n. (CN V)
Trigeminal ganglion
Geniculate ganglion
Facial n. (CN VII)
Vestibulocochlear n. (CN VIII)
Anterior cochlear nucleus
Posterior cochlear nucleus
Glossopharyngeal n. (CN IX)
Vestibular nuclei
Vagus n. (CN X)
Spinal nucleus of trigeminal n.
Nucleus of solitary tract
🟥 Efferent fibers and the nuclei of origin
🟦 Afferent fibers and the nuclei of termination

Cranial Nerve Nuclei in Brain Stem: Schema (Medial View)


Substantia nigra
Red nucleus
Oculomotor n. (CN III)
Mesencephalic nucleus of trigeminal n.
Trigeminal ganglion
Trigeminal n. (CN V)
Principal sensory nucleus of trigeminal n.
Motor nucleus of trigeminal n.
Facial n. (CN VII)
Vestibulocochlear n. (CN VIII)
Abducens n. (CN VI)
Glossopharyngeal n. (CN IX)
Hypoglossal n. (CN XII)
Vagus n. (CN X)
Accessory n. (CN XI)
Inferior olivary complex
Spinal nucleus of trigeminal n.
Accessory nucleus of oculomotor n. (Edinger-Westphal)
Nucleus of oculomotor n.
Nucleus of trochlear n.
Aqueduct of midbrain
Trochlear n. (CN IV)
Nucleus of abducens n.
Genu of facial n.
Nucleus of facial n.
Vestibular nuclei
Cochlear nuclei
Superior salivatory nucleus
Inferior salivatory nucleus
Nucleus of solitary tract
Posterior nucleus of vagus n.
Median aperture of fourth ventricle (foramen of Magendie)
Nucleus of hypoglossal n.
Nucleus ambiguus
Nucleus of accessory n.
Central canal of spinal cord

🟥 **Efferent fibers and nuclei of origin**

🟦 **Afferent fibers and nuclei of termination**

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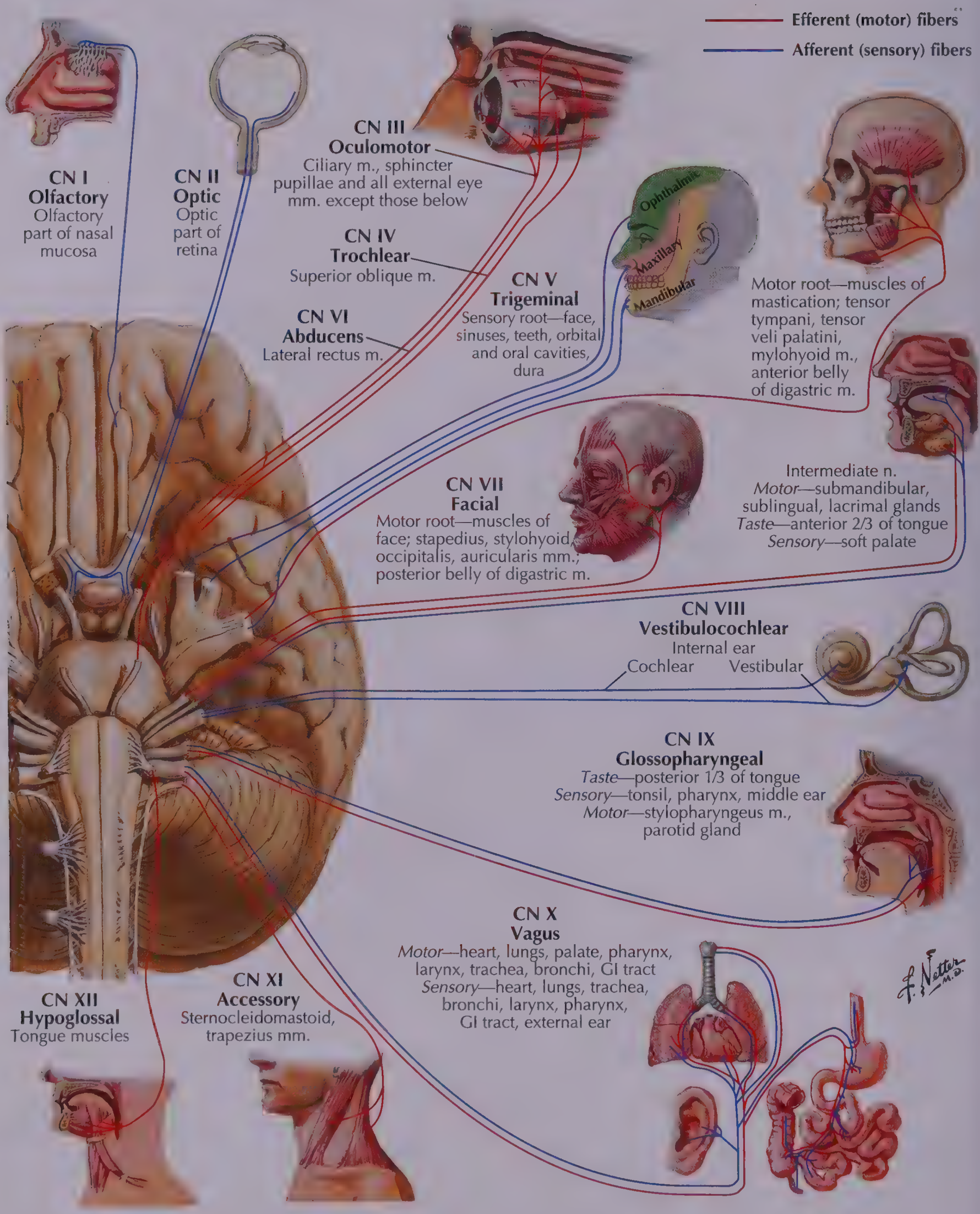
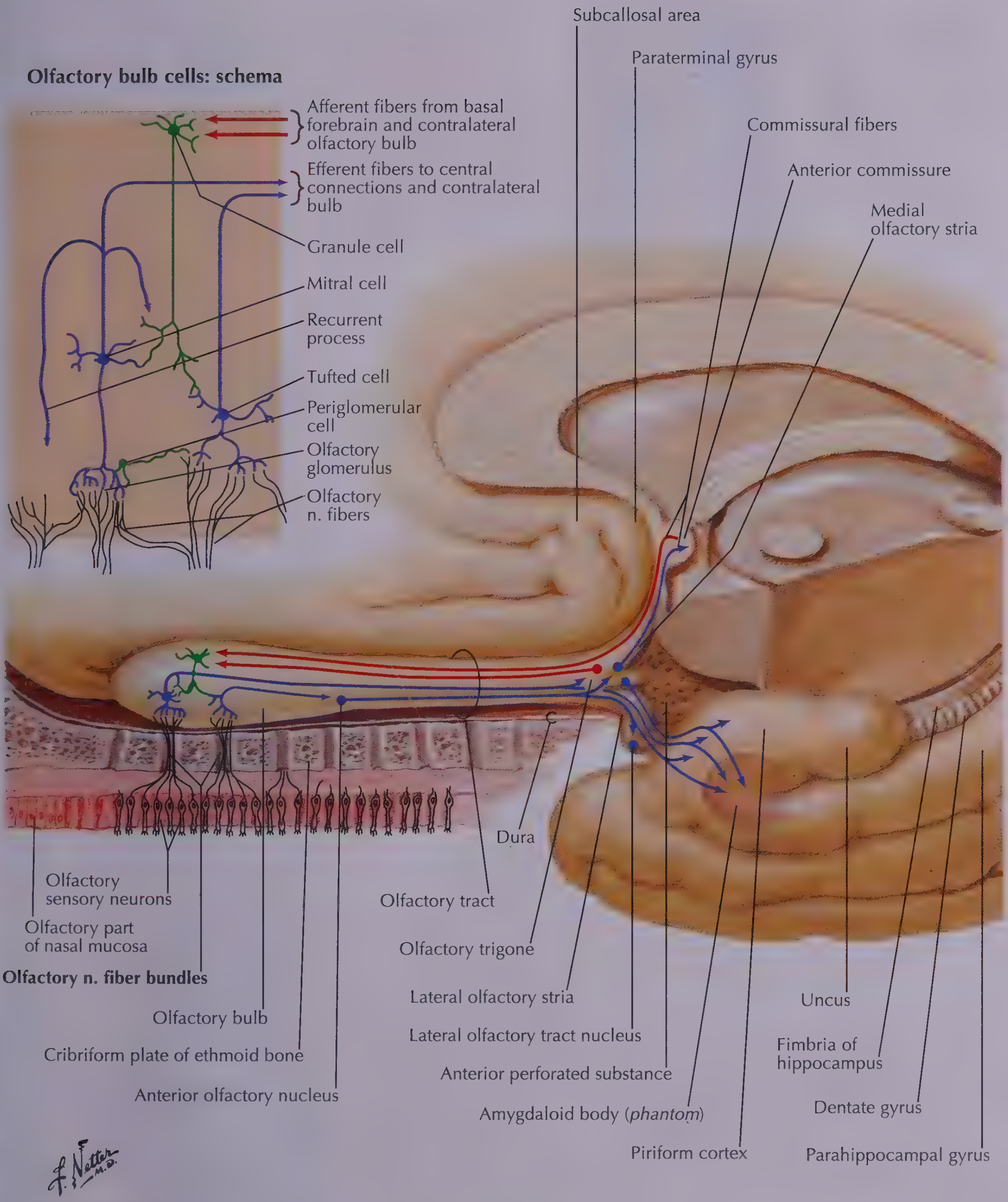
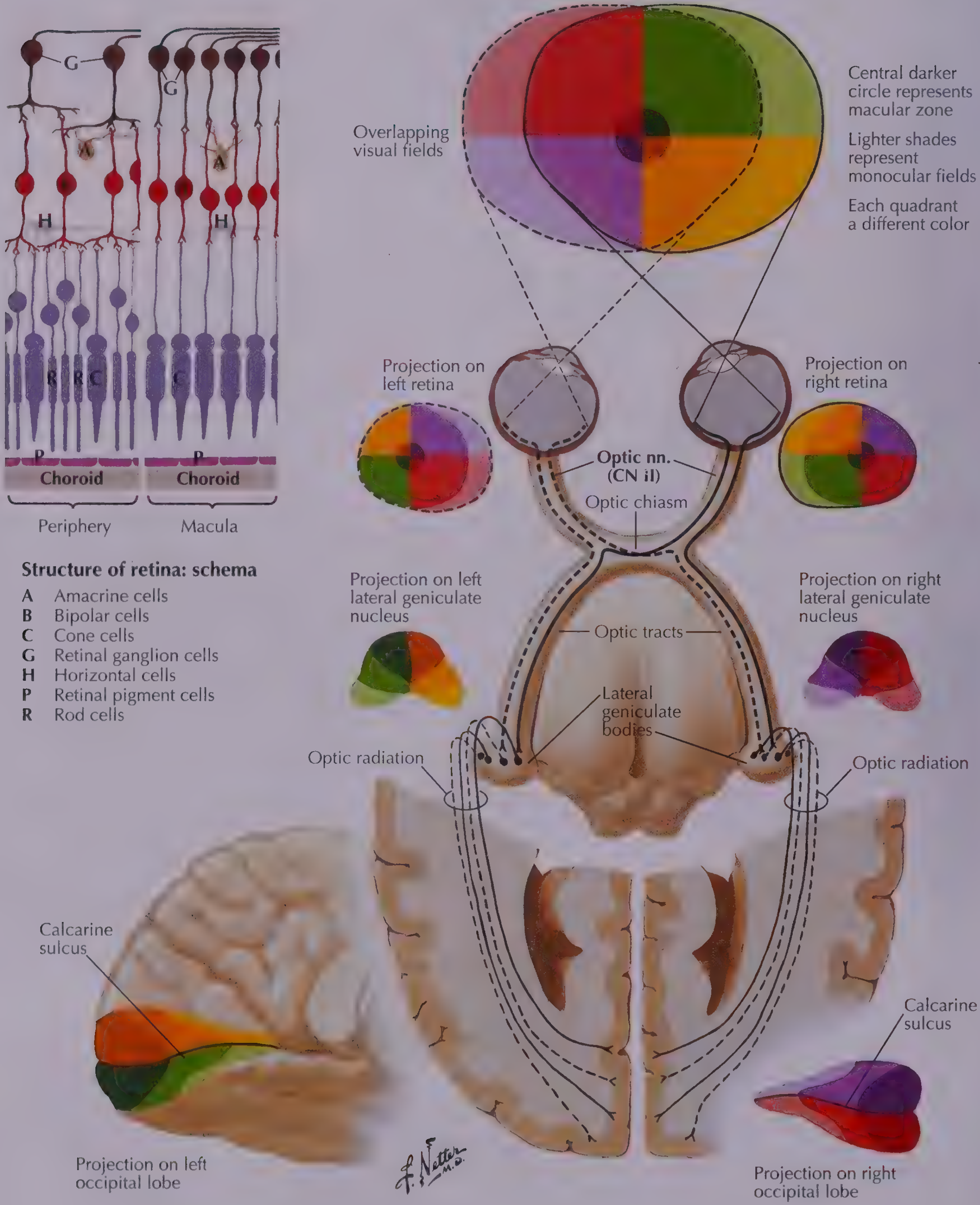
C. Machado M.D.

Cranial Nerves: Schema of Motor and Sensory Distribution


Efferent (motor) fibers
Afferent (sensory) fibers
CN I
Olfactory
Olfactory part of nasal mucosa
CN II
Optic
Optic part of retina
CN III
Oculomotor
Ciliary m., sphincter pupillae and all external eye mm. except those below
CN IV
Trochlear
Superior oblique m.
CN VI
Abducens
Lateral rectus m.
CN V
Trigeminal
Sensory root—face, sinuses, teeth, orbital and oral cavities, dura
Ophthalmic
Maxillary
Mandibular
Motor root—muscles of mastication; tensor tympani, tensor veli palatini, mylohyoid m., anterior belly of digastric m.
CN VII
Facial
Motor root—muscles of face; stapedius, stylohyoid, occipitalis, auricularis mm.; posterior belly of digastric m.
Intermediate n.
Motor—submandibular, sublingual, lacrimal glands
Taste—anterior 2/3 of tongue
Sensory—soft palate
CN VIII
Vestibulocochlear
Internal ear
Cochlear
Vestibular
CN IX
Glossopharyngeal
Taste—posterior 1/3 of tongue
Sensory—tonsil, pharynx, middle ear
Motor—stylopharyngeus m., parotid gland
CN X
Vagus
Motor—heart, lungs, palate, pharynx, larynx, trachea, bronchi, GI tract
Sensory—heart, lungs, trachea, bronchi, larynx, pharynx, GI tract, external ear
CN XI
Accessory
Sternocleidomastoid, trapezius mm.
CN XII
Hypoglossal
Tongue muscles
F. Netter M.D.


Olfactory bulb cells: schema
Afferent fibers from basal forebrain and contralateral olfactory bulb
Efferent fibers to central connections and contralateral bulb
Granule cell
Mitral cell
Recurrent process
Tufted cell
Periglomerular cell
Olfactory glomerulus
Olfactory n. fibers
Subcallosal area
Paraterminal gyrus
Commissural fibers
Anterior commissure
Medial olfactory stria
Olfactory sensory neurons
Olfactory part of nasal mucosa
Olfactory n. fiber bundles
Olfactory bulb
Cribriform plate of ethmoid bone
Anterior olfactory nucleus
Dura
Olfactory tract
Olfactory trigone
Lateral olfactory stria
Lateral olfactory tract nucleus
Anterior perforated substance
Amygdaloid body (phantom)
Piriform cortex
Uncus
Fimbria of hippocampus
Dentate gyrus
Parahippocampal gyrus

Optic Nerve (CN II) and Visual Pathway: Schema

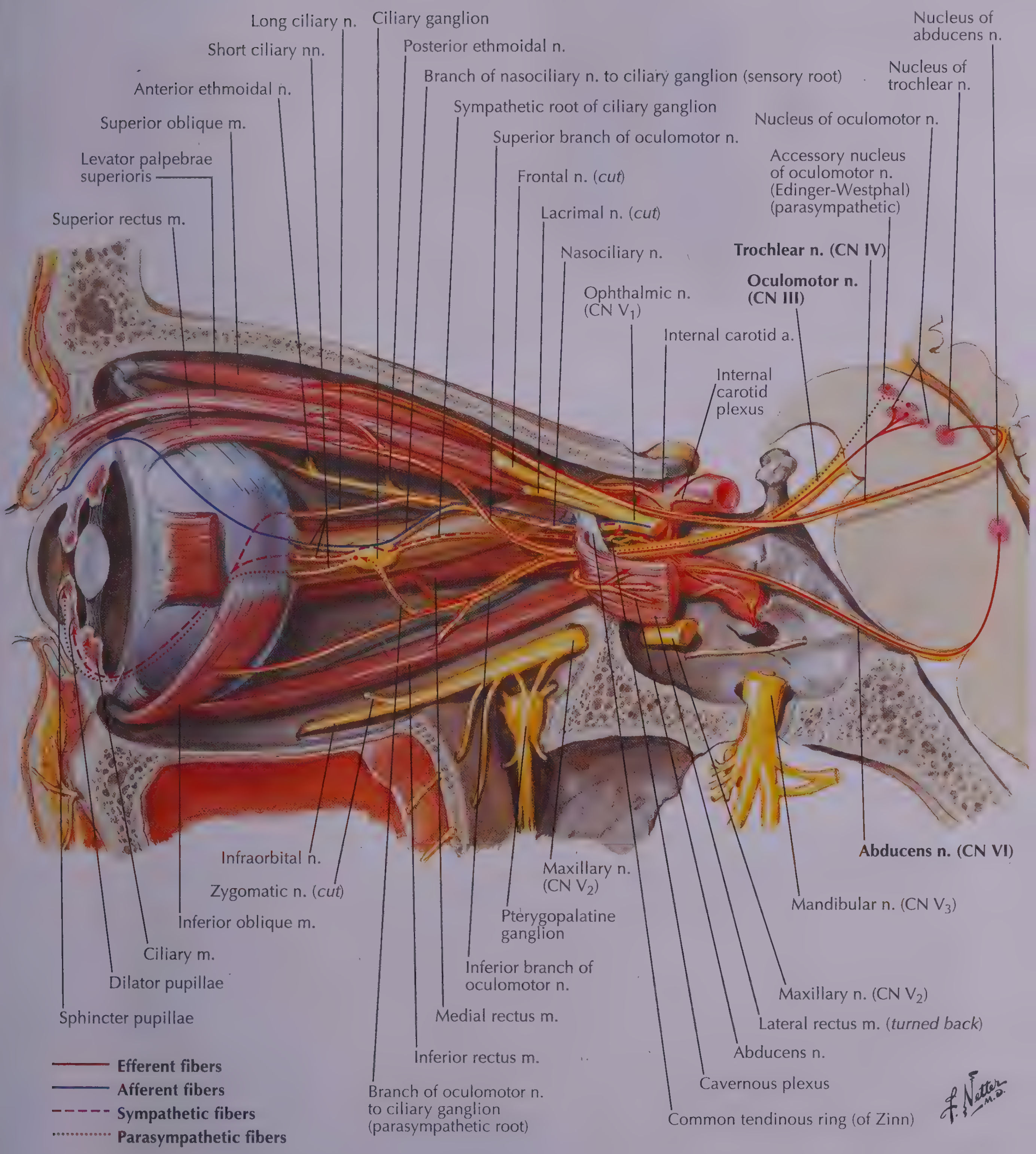

G
G
A
A
H
H
R
R
C
C
P
P
Choroid
Choroid
Periphery
Macula
Overlapping visual fields
Central darker circle represents macular zone
Lighter shades represent monocular fields
Each quadrant a different color
Projection on left retina
Projection on right retina
Optic nn. (CN II)
Optic chiasm
Projection on left lateral geniculate nucleus
Projection on right lateral geniculate nucleus
Optic tracts
Lateral geniculate bodies
Optic radiation
Optic radiation
Calcarine sulcus
Calcarine sulcus
Projection on left occipital lobe
Projection on right occipital lobe
F. Netter M.D.

Structure of retina: schema

A	Amacrine cells
B	Bipolar cells
C	Cone cells
G	Retinal ganglion cells
H	Horizontal cells
P	Retinal pigment cells
R	Rod cells

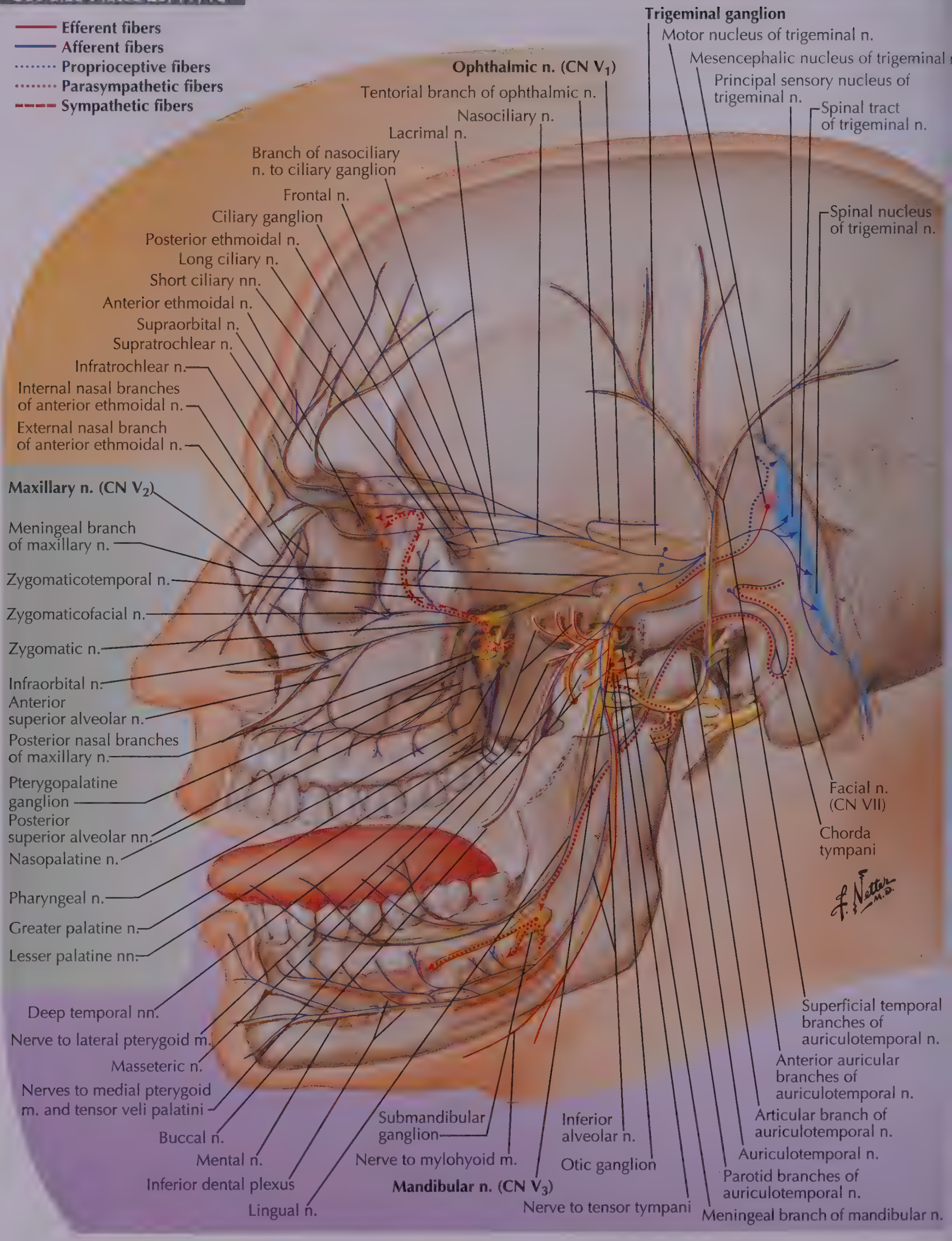
Oculomotor (CN III), Trochlear (CN IV), and Abducens (CN VI) Nerves: Schema

See also Plates 113, 159


Long ciliary n.
Ciliary ganglion
Short ciliary nn.
Posterior ethmoidal n.
Anterior ethmoidal n.
Branch of nasociliary n. to ciliary ganglion (sensory root)
Superior oblique m.
Sympathetic root of ciliary ganglion
Levator palpebrae superioris
Superior branch of oculomotor n.
Frontal n. (*cut*)
Superior rectus m.
Lacrimal n. (*cut*)
Nasociliary n.
Ophthalmic n. (CN V_1)
Internal carotid a.
Internal carotid plexus
Nucleus of abducens n.
Nucleus of trochlear n.
Nucleus of oculomotor n.
Accessory nucleus of oculomotor n. (Edinger-Westphal) (parasympathetic)
Trochlear n. (CN IV)
Oculomotor n. (CN III)
Abducens n. (CN VI)
Mandibular n. (CN V_3)
Infraorbital n.
Zygomatic n. (*cut*)
Maxillary n. (CN V_2)
Inferior oblique m.
Pterygopalatine ganglion
Ciliary m.
Dilator pupillae
Inferior branch of oculomotor n.
Sphincter pupillae
Medial rectus m.
Maxillary n. (CN V_2)
Lateral rectus m. (*turned back*)
Abducens n.
Inferior rectus m.
Cavernous plexus
Branch of oculomotor n. to ciliary ganglion (parasympathetic root)
Common tendinous ring (of Zinn)
F. Netter M.D.
— Efferent fibers
— Afferent fibers
- - - - Sympathetic fibers
········· Parasympathetic fibers

Trigeminal Nerve (CN V): Schema

See also Plates 23, 77, 79


Efferent fibers
Afferent fibers
Proprioceptive fibers
Parasympathetic fibers
Sympathetic fibers
Trigeminal ganglion
Motor nucleus of trigeminal n.
Mesencephalic nucleus of trigeminal
Principal sensory nucleus of trigeminal n.
Spinal tract of trigeminal n.
Spinal nucleus of trigeminal n.
Ophthalmic n. (CN V$_1$)
Tentorial branch of ophthalmic n.
Nasociliary n.
Lacrimal n.
Branch of nasociliary n. to ciliary ganglion
Frontal n.
Ciliary ganglion
Posterior ethmoidal n.
Long ciliary n.
Short ciliary nn.
Anterior ethmoidal n.
Supraorbital n.
Supratrochlear n.
Infratrochlear n.
Internal nasal branches of anterior ethmoidal n.
External nasal branch of anterior ethmoidal n.
Maxillary n. (CN V$_2$)
Meningeal branch of maxillary n.
Zygomaticotemporal n.
Zygomaticofacial n.
Zygomatic n.
Infraorbital n.
Anterior superior alveolar n.
Posterior nasal branches of maxillary n.
Pterygopalatine ganglion
Posterior superior alveolar nn.
Nasopalatine n.
Pharyngeal n.
Greater palatine n.
Lesser palatine nn.
Deep temporal nn.
Nerve to lateral pterygoid m.
Masseteric n.
Nerves to medial pterygoid m. and tensor veli palatini
Buccal n.
Mental n.
Inferior dental plexus
Lingual n.
Submandibular ganglion
Nerve to mylohyoid m.
Mandibular n. (CN V$_3$)
Inferior alveolar n.
Otic ganglion
Nerve to tensor tympani
Meningeal branch of mandibular n.
Parotid branches of auriculotemporal n.
Auriculotemporal n.
Articular branch of auriculotemporal n.
Anterior auricular branches of auriculotemporal n.
Superficial temporal branches of auriculotemporal n.
Chorda tympani
Facial n. (CN VII)
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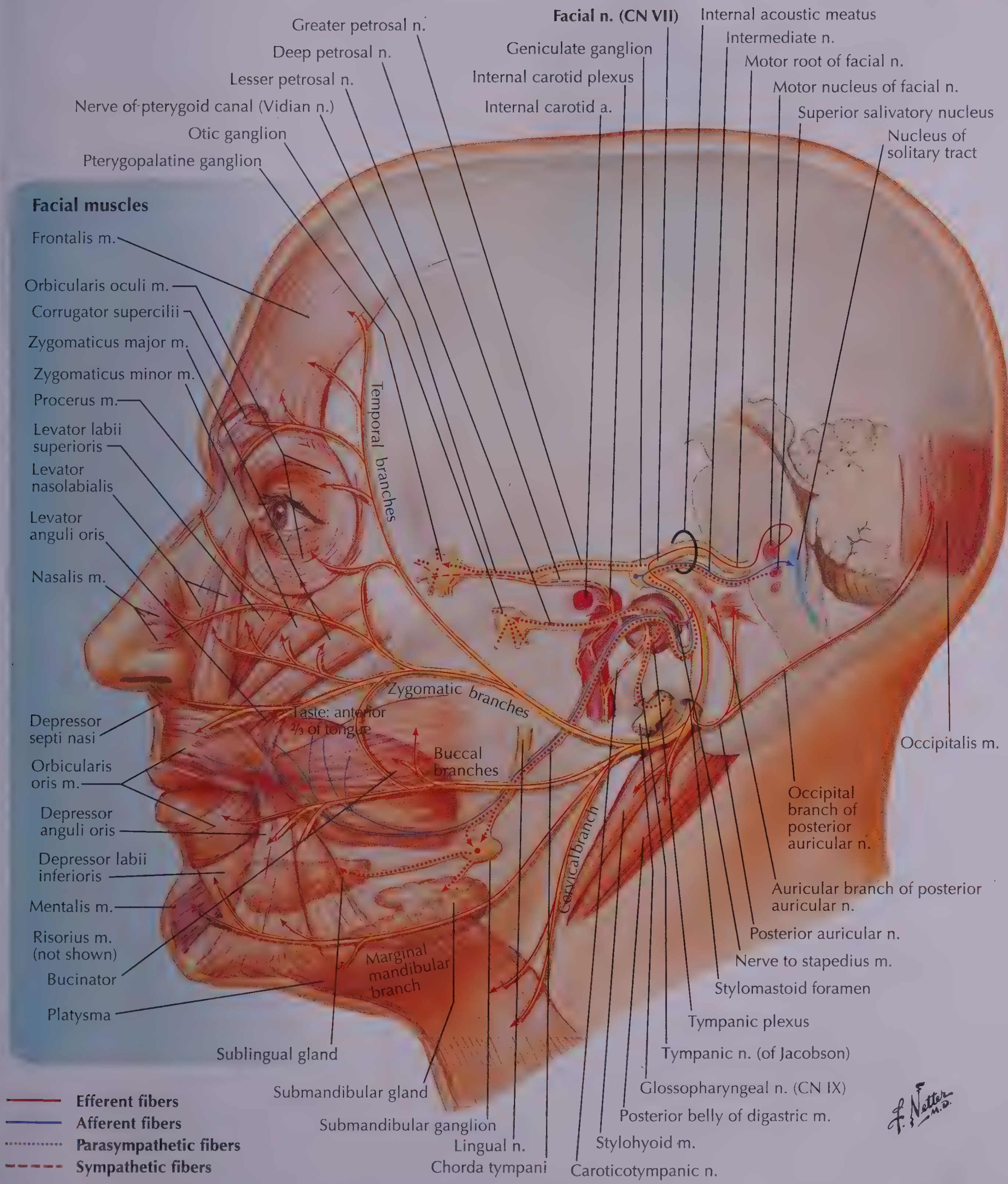
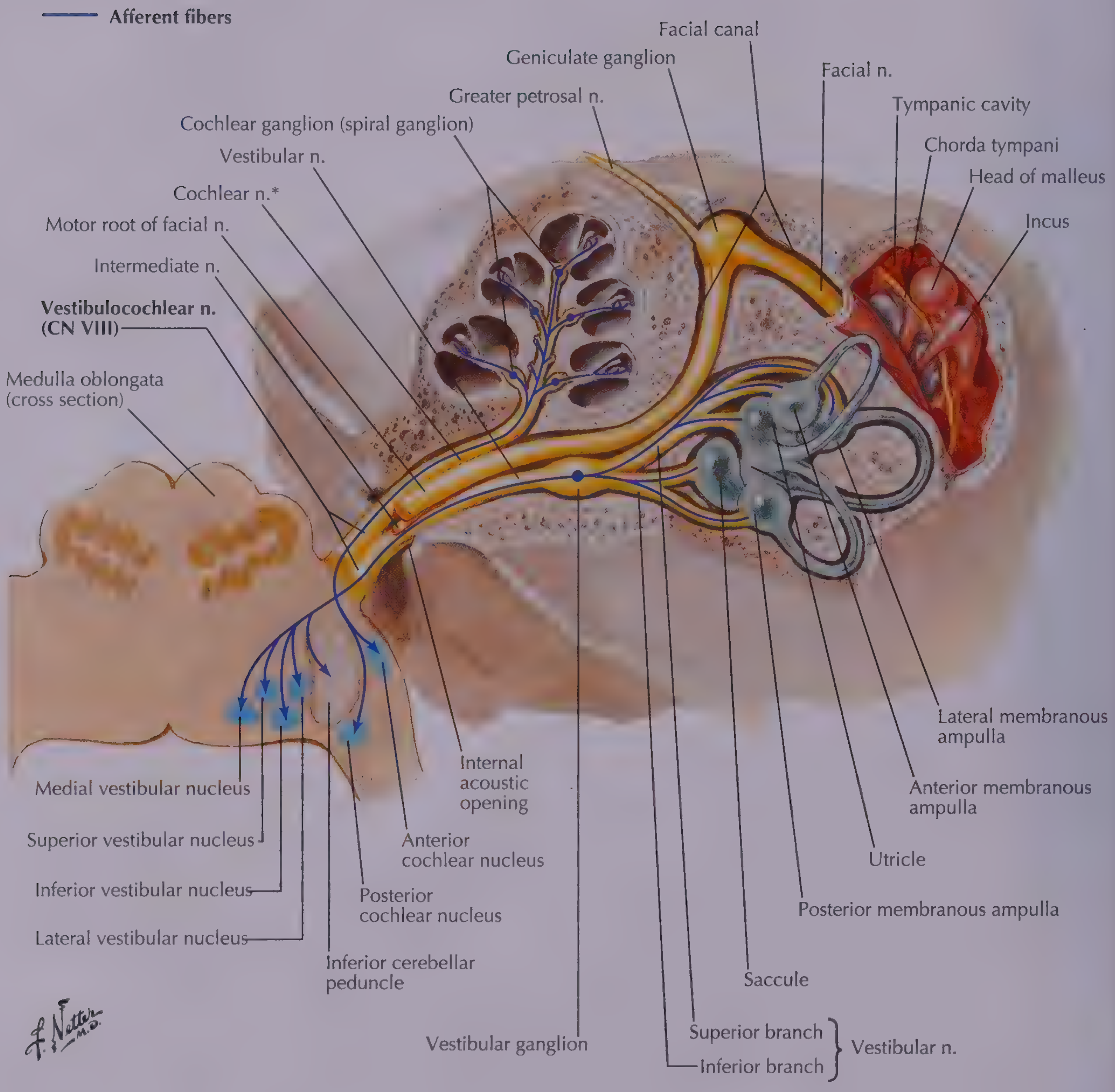
See also Plate 71

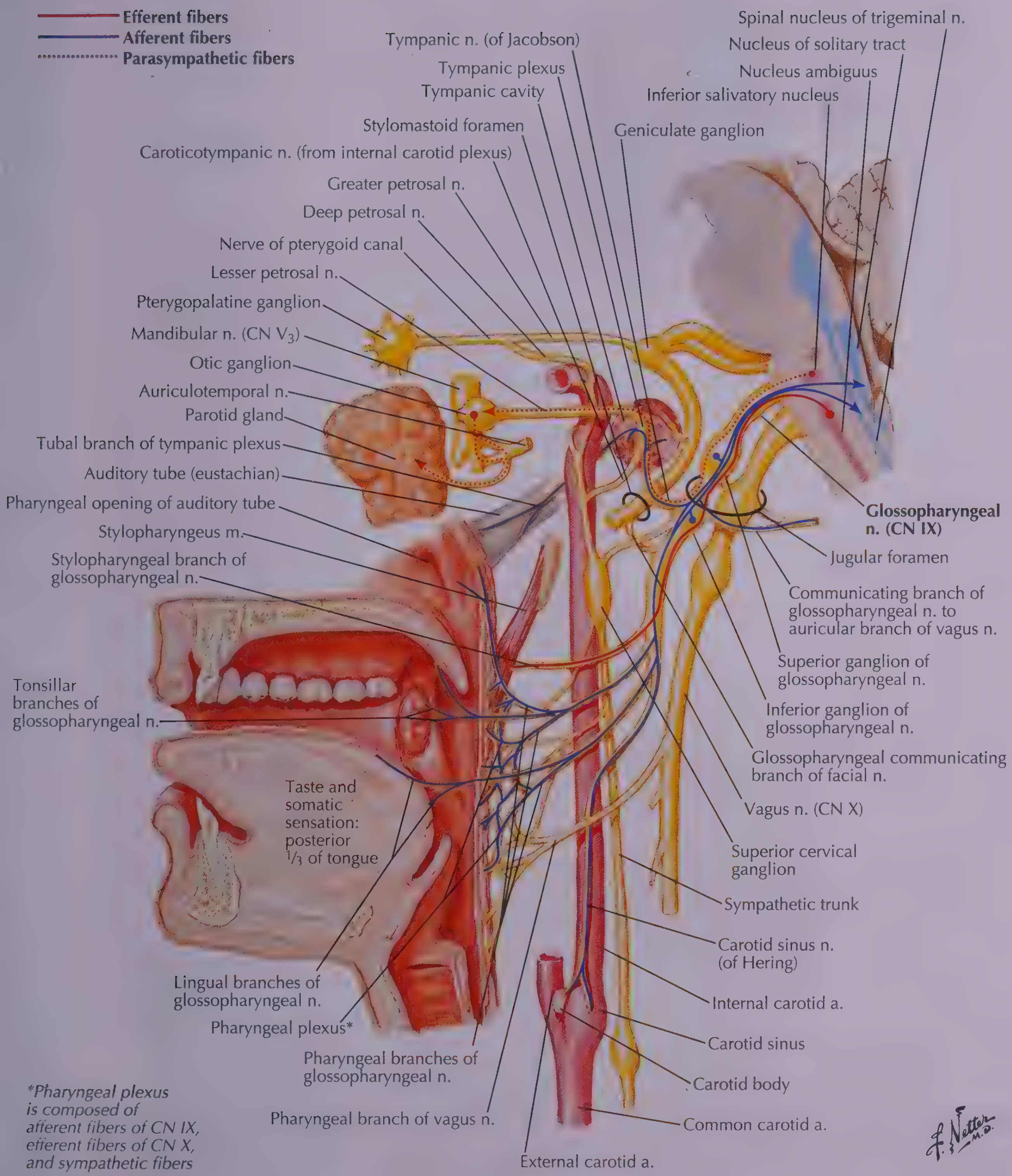

Greater petrosal n.
Deep petrosal n.
Lesser petrosal n.
Nerve of pterygoid canal (Vidian n.)
Otic ganglion
Pterygopalatine ganglion
Facial n. (CN VII)
Geniculate ganglion
Internal carotid plexus
Internal carotid a.
Internal acoustic meatus
Intermediate n.
Motor root of facial n.
Motor nucleus of facial n.
Superior salivatory nucleus
Nucleus of solitary tract
Facial muscles
Frontalis m.
Orbicularis oculi m.
Corrugator supercilii
Zygomaticus major m.
Zygomaticus minor m.
Procerus m.
Levator labii superioris
Levator nasolabialis
Levator anguli oris
Nasalis m.
Depressor septi nasi
Orbicularis oris m.
Depressor anguli oris
Depressor labii inferioris
Mentalis m.
Risorius m. (not shown)
Bucinator
Platysma
Temporal branches
Zygomatic branches
Taste: anterior ⅔ of tongue
Buccal branches
Marginal mandibular branch
Cervical branch
Occipitalis m.
Occipital branch of posterior auricular n.
Auricular branch of posterior auricular n.
Posterior auricular n.
Nerve to stapedius m.
Stylomastoid foramen
Tympanic plexus
Tympanic n. (of Jacobson)
Glossopharyngeal n. (CN IX)
Posterior belly of digastric m.
Stylohyoid m.
Caroticotympanic n.
Chorda tympani
Lingual n.
Submandibular ganglion
Submandibular gland
Sublingual gland
Efferent fibers
Afferent fibers
Parasympathetic fibers
Sympathetic fibers

Vestibulocochlear Nerve (CN VIII): Schema


Afferent fibers
Facial canal
Geniculate ganglion
Facial n.
Greater petrosal n.
Tympanic cavity
Cochlear ganglion (spiral ganglion)
Chorda tympani
Vestibular n.
Head of malleus
Cochlear n.*
Incus
Motor root of facial n.
Intermediate n.
Vestibulocochlear n. (CN VIII)
Medulla oblongata (cross section)
Lateral membranous ampulla
Internal acoustic opening
Anterior membranous ampulla
Medial vestibular nucleus
Superior vestibular nucleus
Anterior cochlear nucleus
Utricle
Inferior vestibular nucleus
Posterior cochlear nucleus
Posterior membranous ampulla
Lateral vestibular nucleus
Inferior cerebellar peduncle
Saccule
Vestibular ganglion
Superior branch
Inferior branch
Vestibular n.

Note: The cochlear nerve also contains efferent fibers to the sensory epithelium. These fibers are derived from the vestibular nerve while in the internal acoustic meatus.

Glossopharyngeal Nerve (CN IX): Schema


Efferent fibers
Afferent fibers
Parasympathetic fibers
Tympanic n. (of Jacobson)
Tympanic plexus
Tympanic cavity
Stylomastoid foramen
Caroticotympanic n. (from internal carotid plexus)
Greater petrosal n.
Deep petrosal n.
Nerve of pterygoid canal
Lesser petrosal n.
Pterygopalatine ganglion
Mandibular n. (CN V3)
Otic ganglion
Auriculotemporal n.
Parotid gland
Tubal branch of tympanic plexus
Auditory tube (eustachian)
Pharyngeal opening of auditory tube
Stylopharyngeus m.
Stylopharyngeal branch of glossopharyngeal n.
Tonsillar branches of glossopharyngeal n.
Taste and somatic sensation: posterior 1/3 of tongue
Lingual branches of glossopharyngeal n.
Pharyngeal plexus*
Pharyngeal branches of glossopharyngeal n.
Pharyngeal branch of vagus n.
External carotid a.
Spinal nucleus of trigeminal n.
Nucleus of solitary tract
Nucleus ambiguus
Inferior salivatory nucleus
Geniculate ganglion
Glossopharyngeal n. (CN IX)
Jugular foramen
Communicating branch of glossopharyngeal n. to auricular branch of vagus n.
Superior ganglion of glossopharyngeal n.
Inferior ganglion of glossopharyngeal n.
Glossopharyngeal communicating branch of facial n.
Vagus n. (CN X)
Superior cervical ganglion
Sympathetic trunk
Carotid sinus n. (of Hering)
Internal carotid a.
Carotid sinus
Carotid body
Common carotid a.
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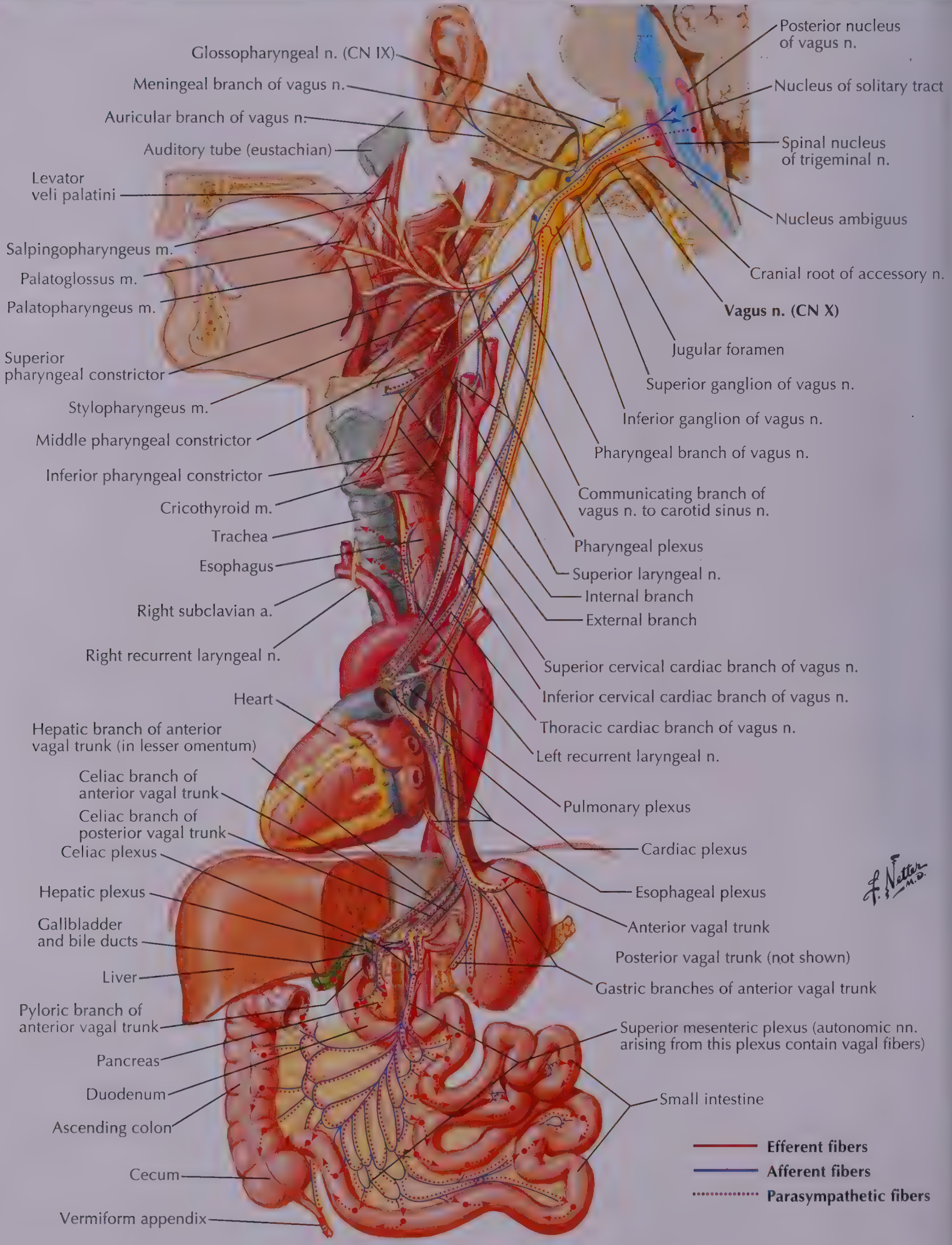
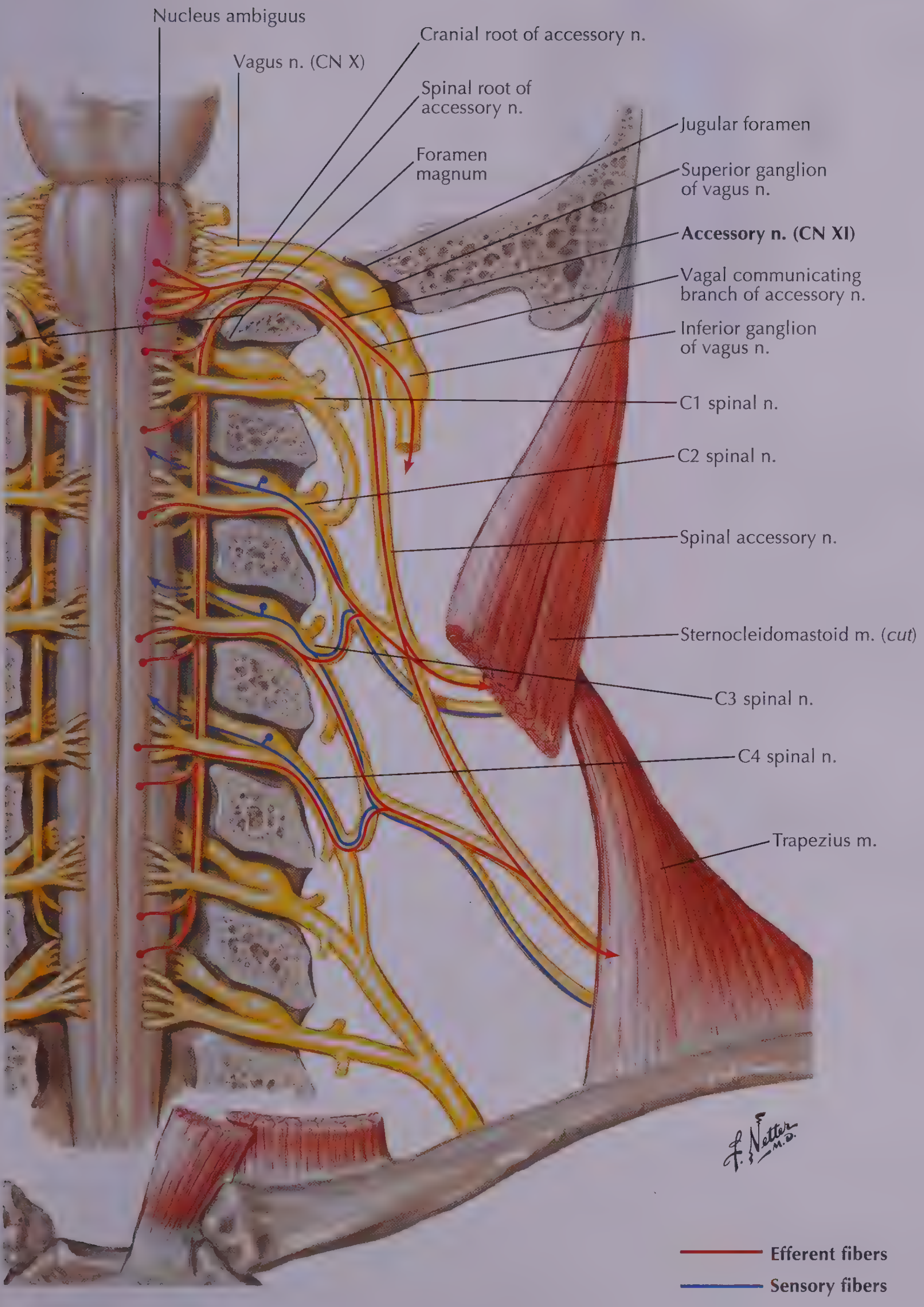
**Pharyngeal plexus is composed of afferent fibers of CN IX, efferent fibers of CN X, and sympathetic fibers*

Vagus Nerve (CN X): Schema


Glossopharyngeal n. (CN IX)
Meningeal branch of vagus n.
Auricular branch of vagus n.
Auditory tube (eustachian)
Levator veli palatini
Salpingopharyngeus m.
Palatoglossus m.
Palatopharyngeus m.
Superior pharyngeal constrictor
Stylopharyngeus m.
Middle pharyngeal constrictor
Inferior pharyngeal constrictor
Cricothyroid m.
Trachea
Esophagus
Right subclavian a.
Right recurrent laryngeal n.
Heart
Hepatic branch of anterior vagal trunk (in lesser omentum)
Celiac branch of anterior vagal trunk
Celiac branch of posterior vagal trunk
Celiac plexus
Hepatic plexus
Gallbladder and bile ducts
Liver
Pyloric branch of anterior vagal trunk
Pancreas
Duodenum
Ascending colon
Cecum
Vermiform appendix
Posterior nucleus of vagus n.
Nucleus of solitary tract
Spinal nucleus of trigeminal n.
Nucleus ambiguus
Cranial root of accessory n.
Vagus n. (CN X)
Jugular foramen
Superior ganglion of vagus n.
Inferior ganglion of vagus n.
Pharyngeal branch of vagus n.
Communicating branch of vagus n. to carotid sinus n.
Pharyngeal plexus
Superior laryngeal n.
Internal branch
External branch
Superior cervical cardiac branch of vagus n.
Inferior cervical cardiac branch of vagus n.
Thoracic cardiac branch of vagus n.
Left recurrent laryngeal n.
Pulmonary plexus
Cardiac plexus
Esophageal plexus
Anterior vagal trunk
Posterior vagal trunk (not shown)
Gastric branches of anterior vagal trunk
Superior mesenteric plexus (autonomic nn. arising from this plexus contain vagal fibers)
Small intestine
Efferent fibers
Afferent fibers
Parasympathetic fibers

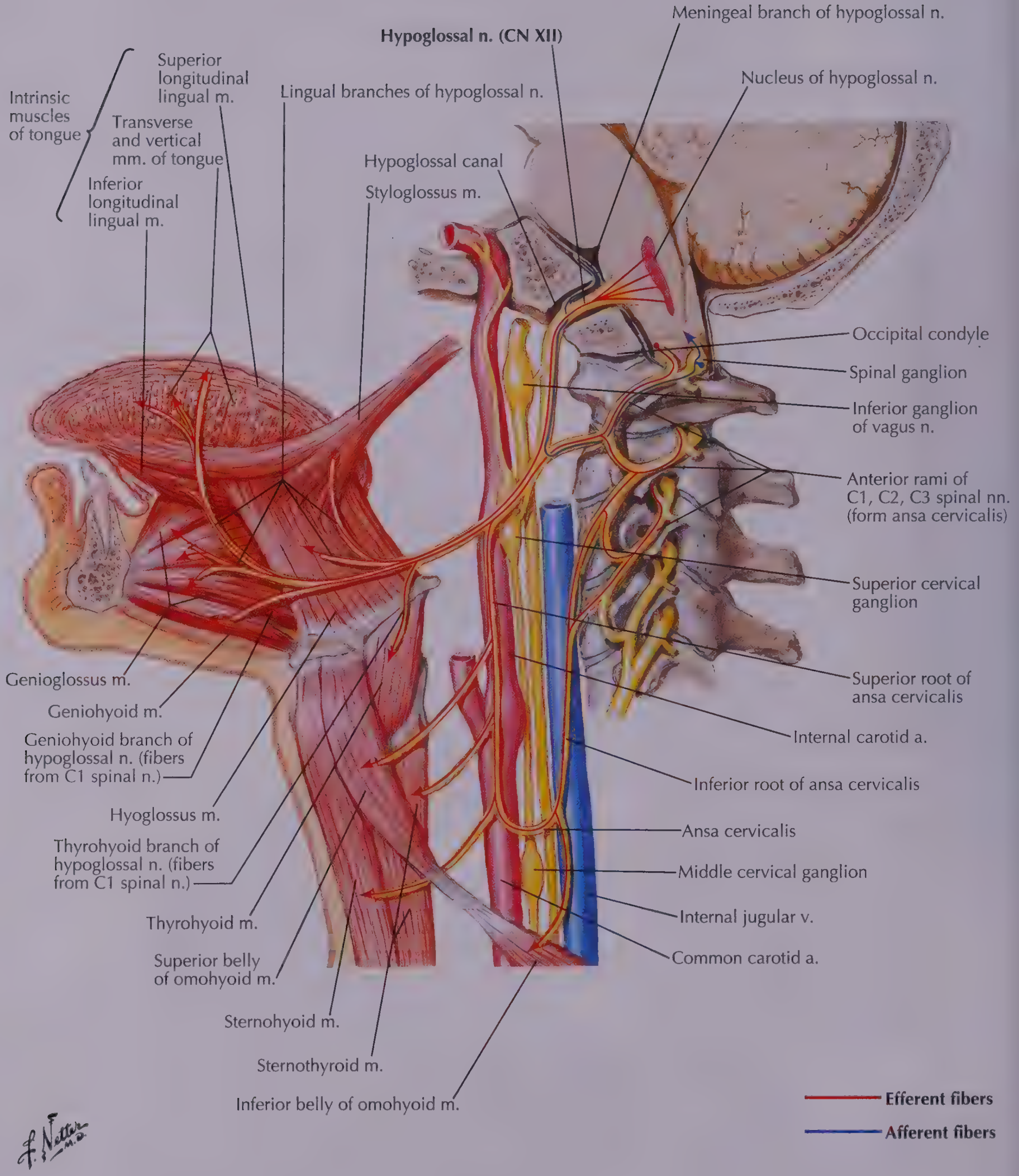
Accessory Nerve (CN XI): Schema

See also Plate 56


Nucleus ambiguus
Cranial root of accessory n.
Vagus n. (CN X)
Spinal root of accessory n.
Foramen magnum
Jugular foramen
Superior ganglion of vagus n.
Accessory n. (CN XI)
Vagal communicating branch of accessory n.
Inferior ganglion of vagus n.
C1 spinal n.
C2 spinal n.
Spinal accessory n.
Sternocleidomastoid m. (*cut*)
C3 spinal n.
C4 spinal n.
Trapezius m.
Efferent fibers
Sensory fibers

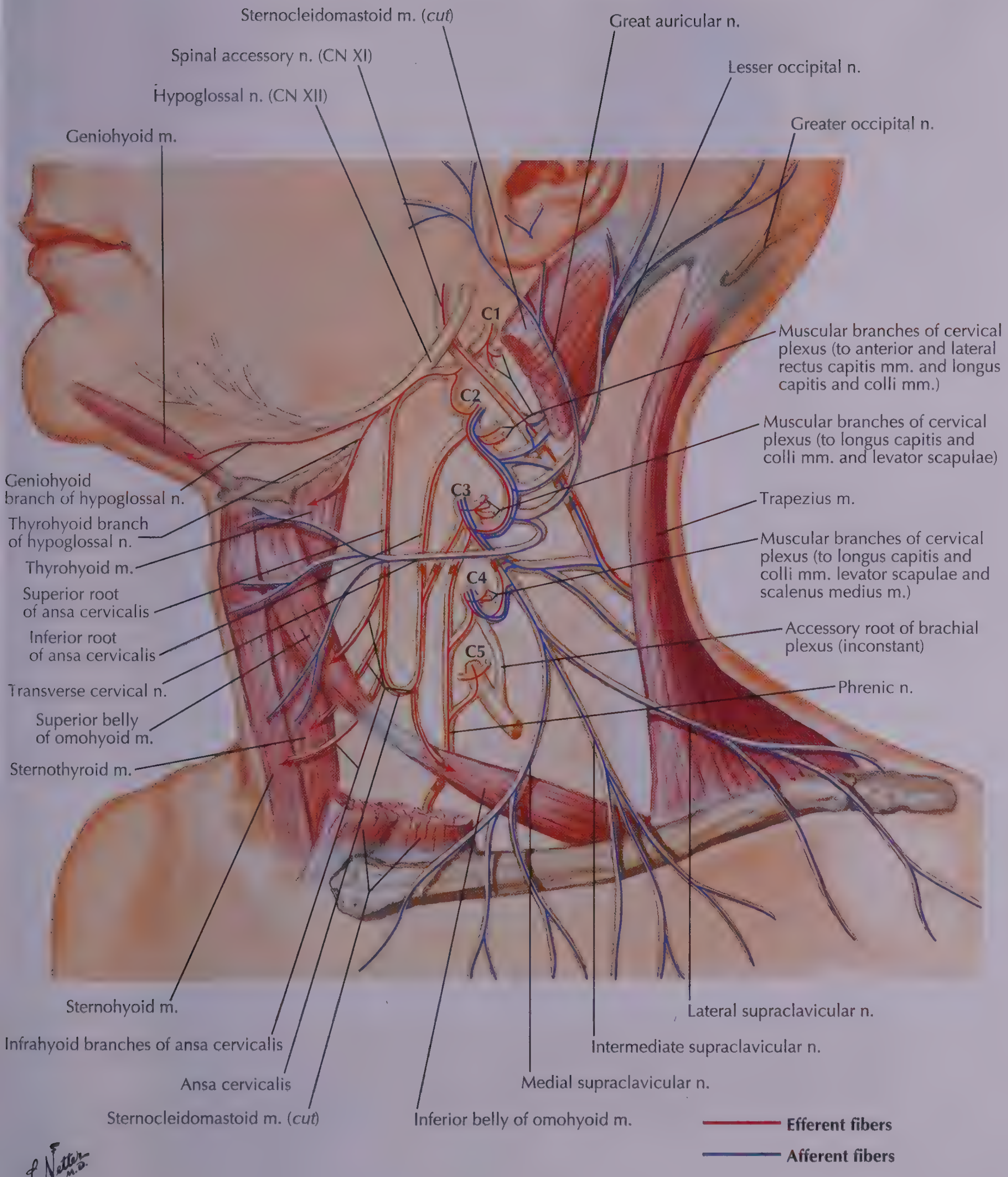
Hypoglossal Nerve (CN XII): Schema

See also Plate 56


Meningeal branch of hypoglossal n.
Hypoglossal n. (CN XII)
Nucleus of hypoglossal n.
Superior longitudinal lingual m.
Intrinsic muscles of tongue
Transverse and vertical mm. of tongue
Inferior longitudinal lingual m.
Lingual branches of hypoglossal n.
Hypoglossal canal
Styloglossus m.
Occipital condyle
Spinal ganglion
Inferior ganglion of vagus n.
Anterior rami of C1, C2, C3 spinal nn. (form ansa cervicalis)
Superior cervical ganglion
Superior root of ansa cervicalis
Internal carotid a.
Inferior root of ansa cervicalis
Ansa cervicalis
Middle cervical ganglion
Internal jugular v.
Common carotid a.
Genioglossus m.
Geniohyoid m.
Geniohyoid branch of hypoglossal n. (fibers from C1 spinal n.)
Hyoglossus m.
Thyrohyoid branch of hypoglossal n. (fibers from C1 spinal n.)
Thyrohyoid m.
Superior belly of omohyoid m.
Sternohyoid m.
Sternothyroid m.
Inferior belly of omohyoid m.
Efferent fibers
Afferent fibers
F. Netter M.D.

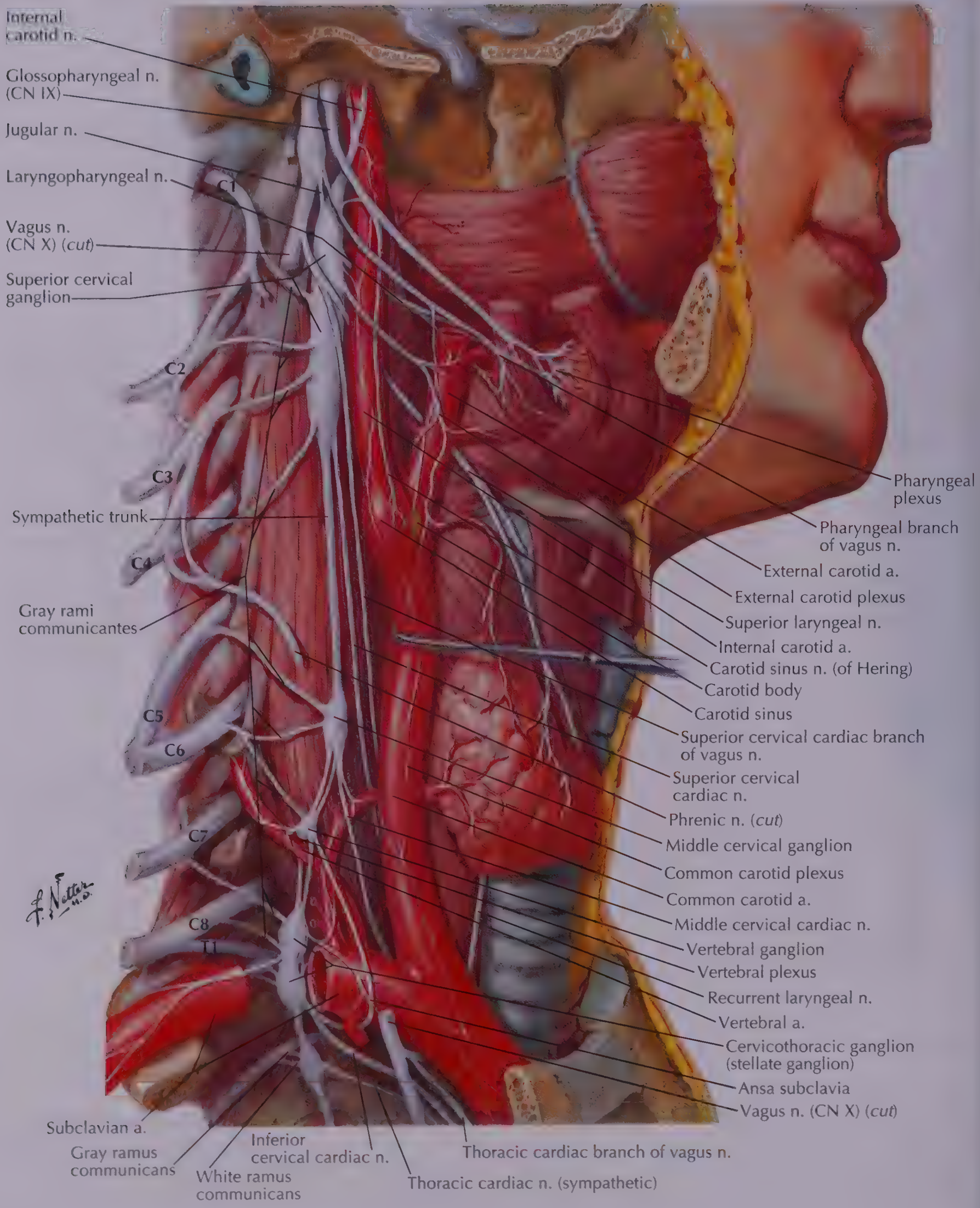
Cervical Plexus: Schema

See also Plates 56, 57

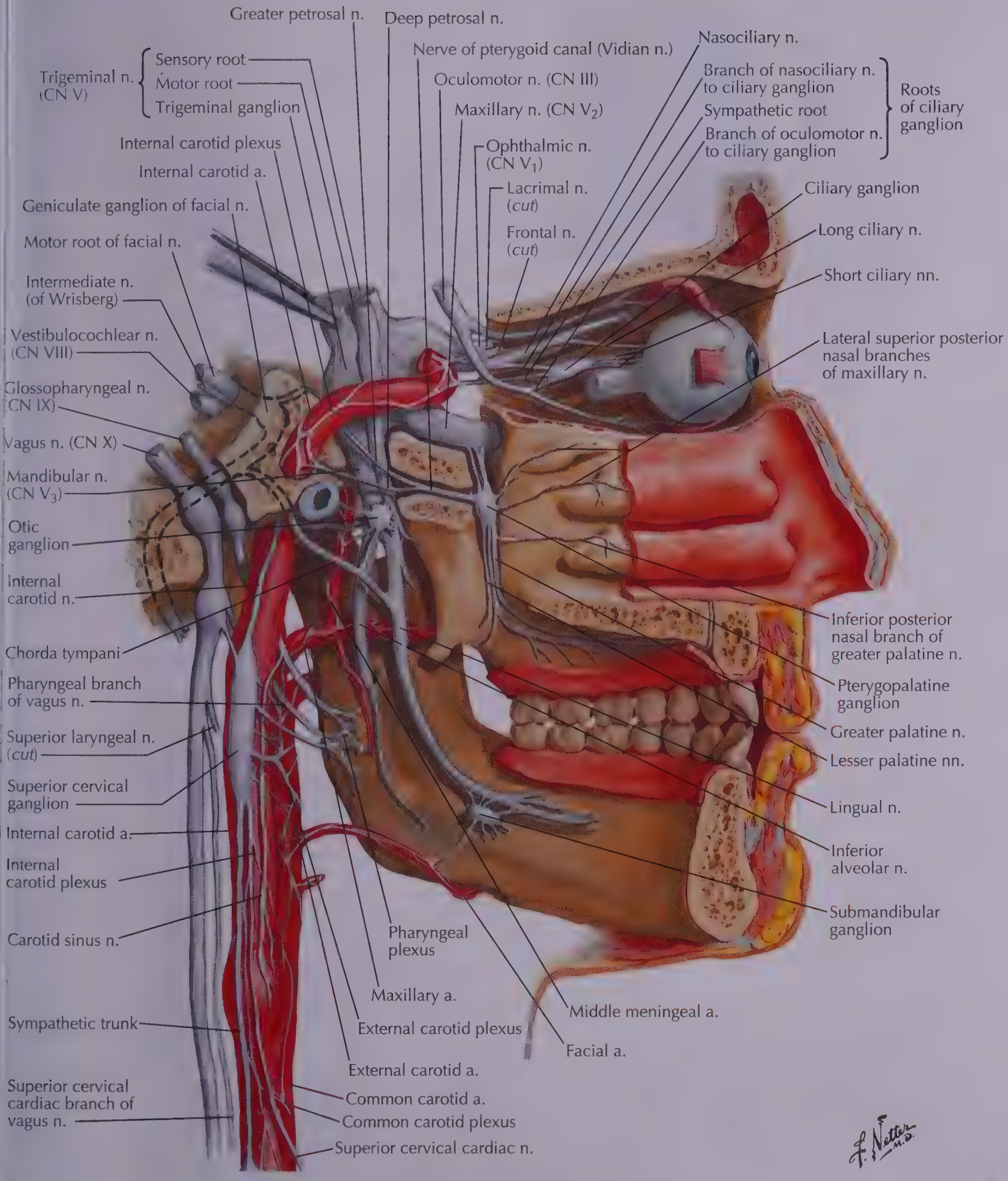

Sternocleidomastoid m. (*cut*)
Spinal accessory n. (CN XI)
Hypoglossal n. (CN XII)
Geniohyoid m.
Great auricular n.
Lesser occipital n.
Greater occipital n.
C1
C2
C3
C4
C5
Muscular branches of cervical plexus (to anterior and lateral rectus capitis mm. and longus capitis and colli mm.)
Muscular branches of cervical plexus (to longus capitis and colli mm. and levator scapulae)
Trapezius m.
Muscular branches of cervical plexus (to longus capitis and colli mm. levator scapulae and scalenus medius m.)
Accessory root of brachial plexus (inconstant)
Phrenic n.
Geniohyoid branch of hypoglossal n.
Thyrohyoid branch of hypoglossal n.
Thyrohyoid m.
Superior root of ansa cervicalis
Inferior root of ansa cervicalis
Transverse cervical n.
Superior belly of omohyoid m.
Sternothyroid m.
Sternohyoid m.
Infrahyoid branches of ansa cervicalis
Ansa cervicalis
Sternocleidomastoid m. (*cut*)
Inferior belly of omohyoid m.
Medial supraclavicular n.
Intermediate supraclavicular n.
Lateral supraclavicular n.
Efferent fibers
Afferent fibers

Autonomic Nerves in Neck

See also Plate 152

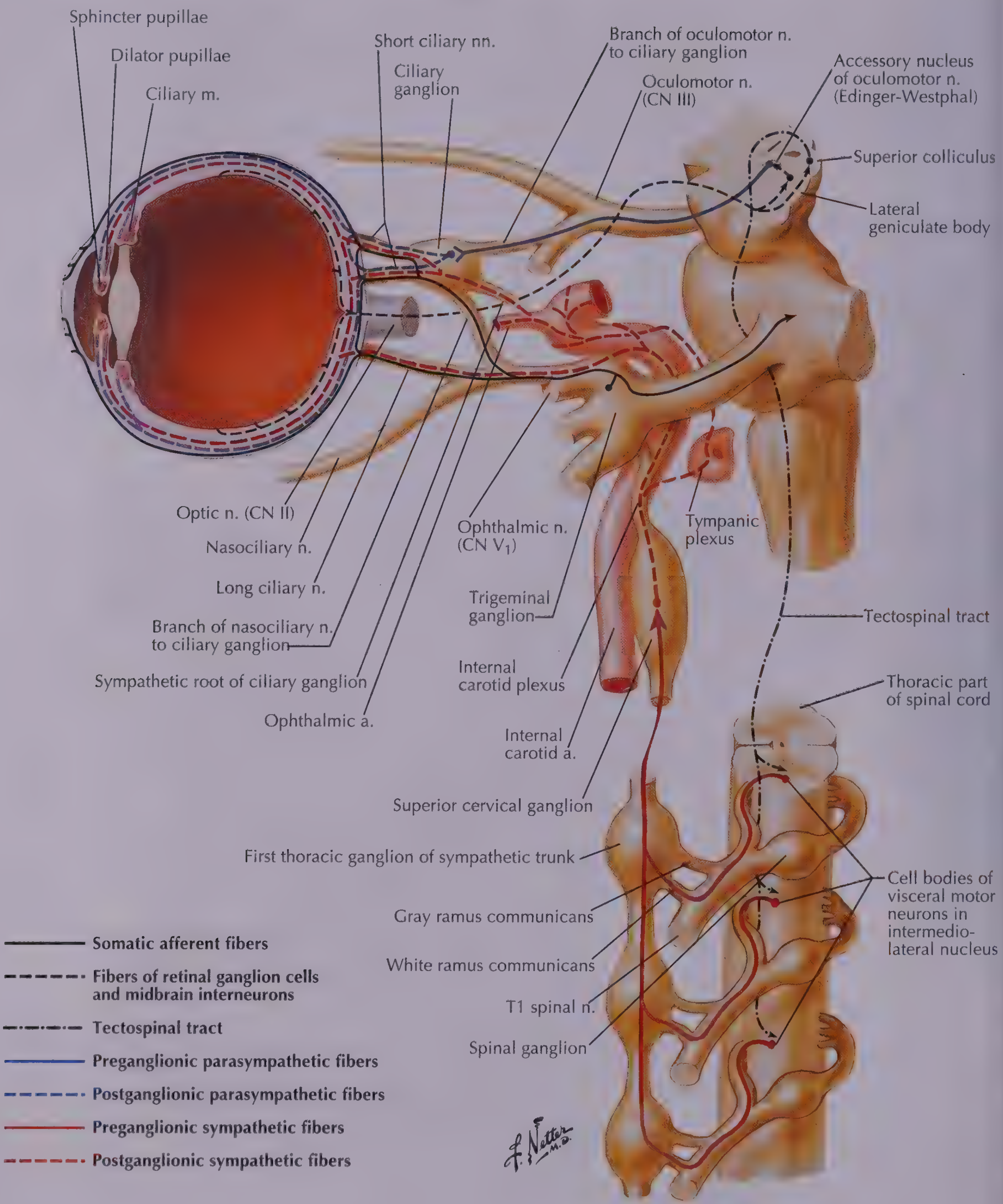

Internal carotid n.
Glossopharyngeal n. (CN IX)
Jugular n.
Laryngopharyngeal n.
Vagus n. (CN X) (*cut*)
Superior cervical ganglion
C1
C2
C3
Sympathetic trunk
C4
Gray rami communicantes
C5
C6
C7
C8
T1
Subclavian a.
Gray ramus communicans
White ramus communicans
Inferior cervical cardiac n.
Thoracic cardiac n. (sympathetic)
Thoracic cardiac branch of vagus n.
Pharyngeal plexus
Pharyngeal branch of vagus n.
External carotid a.
External carotid plexus
Superior laryngeal n.
Internal carotid a.
Carotid sinus n. (of Hering)
Carotid body
Carotid sinus
Superior cervical cardiac branch of vagus n.
Superior cervical cardiac n.
Phrenic n. (*cut*)
Middle cervical ganglion
Common carotid plexus
Common carotid a.
Middle cervical cardiac n.
Vertebral ganglion
Vertebral plexus
Recurrent laryngeal n.
Vertebral a.
Cervicothoracic ganglion (stellate ganglion)
Ansa subclavia
Vagus n. (CN X) (*cut*)
F. Netter M.D.

See also Plates 80, 149, 160


Greater petrosal n.
Deep petrosal n.
Nerve of pterygoid canal (Vidian n.)
Nasociliary n.
Trigeminal n. (CN V)
Sensory root
Motor root
Trigeminal ganglion
Oculomotor n. (CN III)
Maxillary n. (CN V_2)
Branch of nasociliary n. to ciliary ganglion
Sympathetic root
Branch of oculomotor n. to ciliary ganglion
Roots of ciliary ganglion
Internal carotid plexus
Internal carotid a.
Ophthalmic n. (CN V_1)
Lacrimal n. (*cut*)
Frontal n. (*cut*)
Ciliary ganglion
Long ciliary n.
Short ciliary nn.
Geniculate ganglion of facial n.
Motor root of facial n.
Intermediate n. (of Wrisberg)
Vestibulocochlear n. (CN VIII)
Glossopharyngeal n. (CN IX)
Vagus n. (CN X)
Mandibular n. (CN V_3)
Otic ganglion
Internal carotid n.
Chorda tympani
Pharyngeal branch of vagus n.
Superior laryngeal n. (*cut*)
Superior cervical ganglion
Internal carotid a.
Internal carotid plexus
Carotid sinus n.
Sympathetic trunk
Superior cervical cardiac branch of vagus n.
Lateral superior posterior nasal branches of maxillary n.
Inferior posterior nasal branch of greater palatine n.
Pterygopalatine ganglion
Greater palatine n.
Lesser palatine nn.
Lingual n.
Inferior alveolar n.
Submandibular ganglion
Pharyngeal plexus
Maxillary a.
Middle meningeal a.
External carotid plexus
Facial a.
External carotid a.
Common carotid a.
Common carotid plexus
Superior cervical cardiac n.

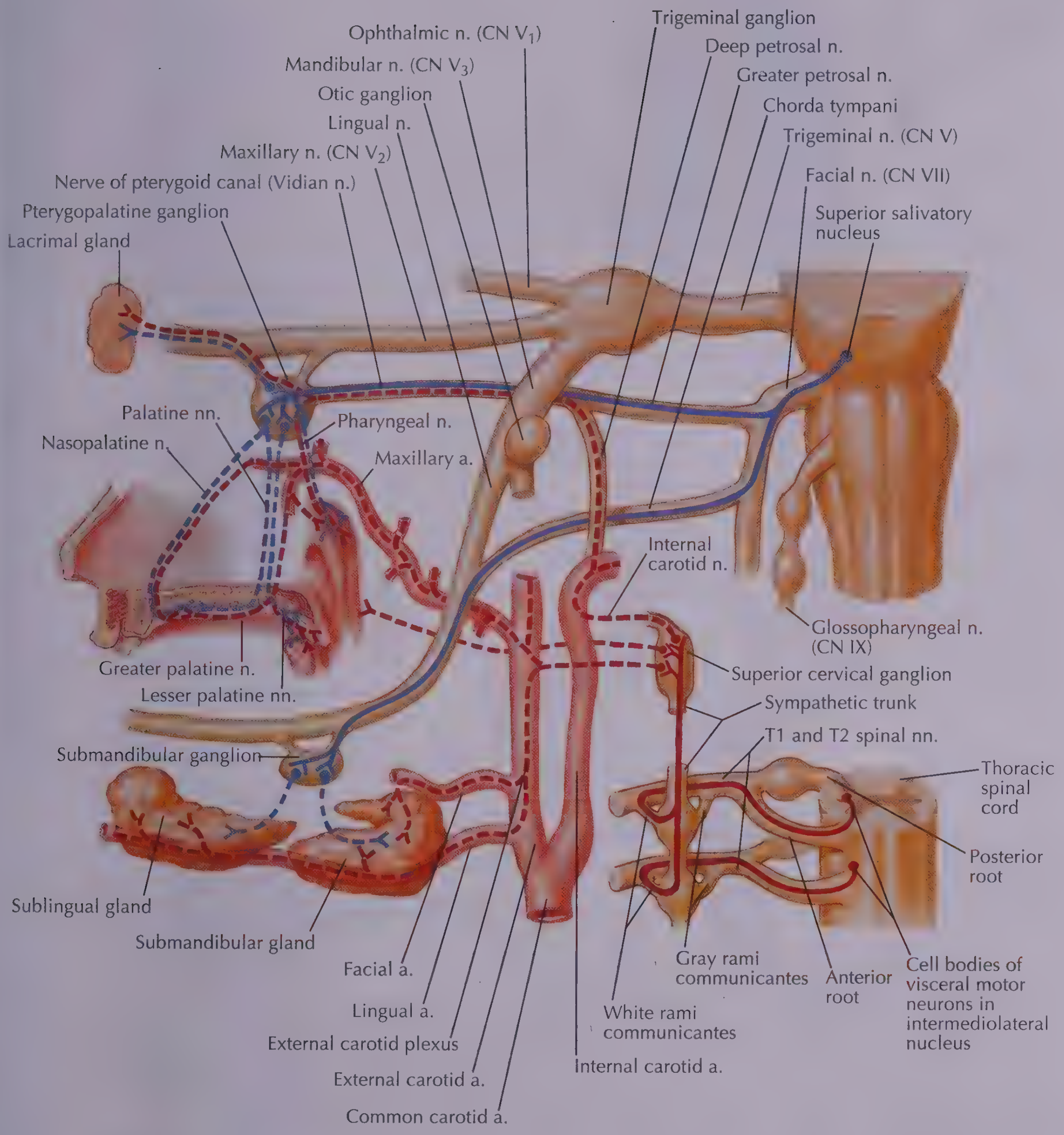
Ciliary Ganglion: Schema

See also Plates 80, 149, 160


Sphincter pupillae
Dilator pupillae
Ciliary m.
Short ciliary nn.
Ciliary ganglion
Branch of oculomotor n. to ciliary ganglion
Oculomotor n. (CN III)
Accessory nucleus of oculomotor n. (Edinger-Westphal)
Superior colliculus
Lateral geniculate body
Optic n. (CN II)
Nasociliary n.
Long ciliary n.
Branch of nasociliary n. to ciliary ganglion
Sympathetic root of ciliary ganglion
Ophthalmic a.
Ophthalmic n. (CN V1)
Trigeminal ganglion
Internal carotid plexus
Internal carotid a.
Tympanic plexus
Tectospinal tract
Thoracic part of spinal cord
Superior cervical ganglion
First thoracic ganglion of sympathetic trunk
Gray ramus communicans
White ramus communicans
T1 spinal n.
Spinal ganglion
Cell bodies of visceral motor neurons in intermediolateral nucleus
F. Netter M.D.
Somatic afferent fibers
Fibers of retinal ganglion cells and midbrain interneurons
Tectospinal tract
Preganglionic parasympathetic fibers
Postganglionic parasympathetic fibers
Preganglionic sympathetic fibers
Postganglionic sympathetic fibers

Pterygopalatine and Submandibular Ganglia: Schema

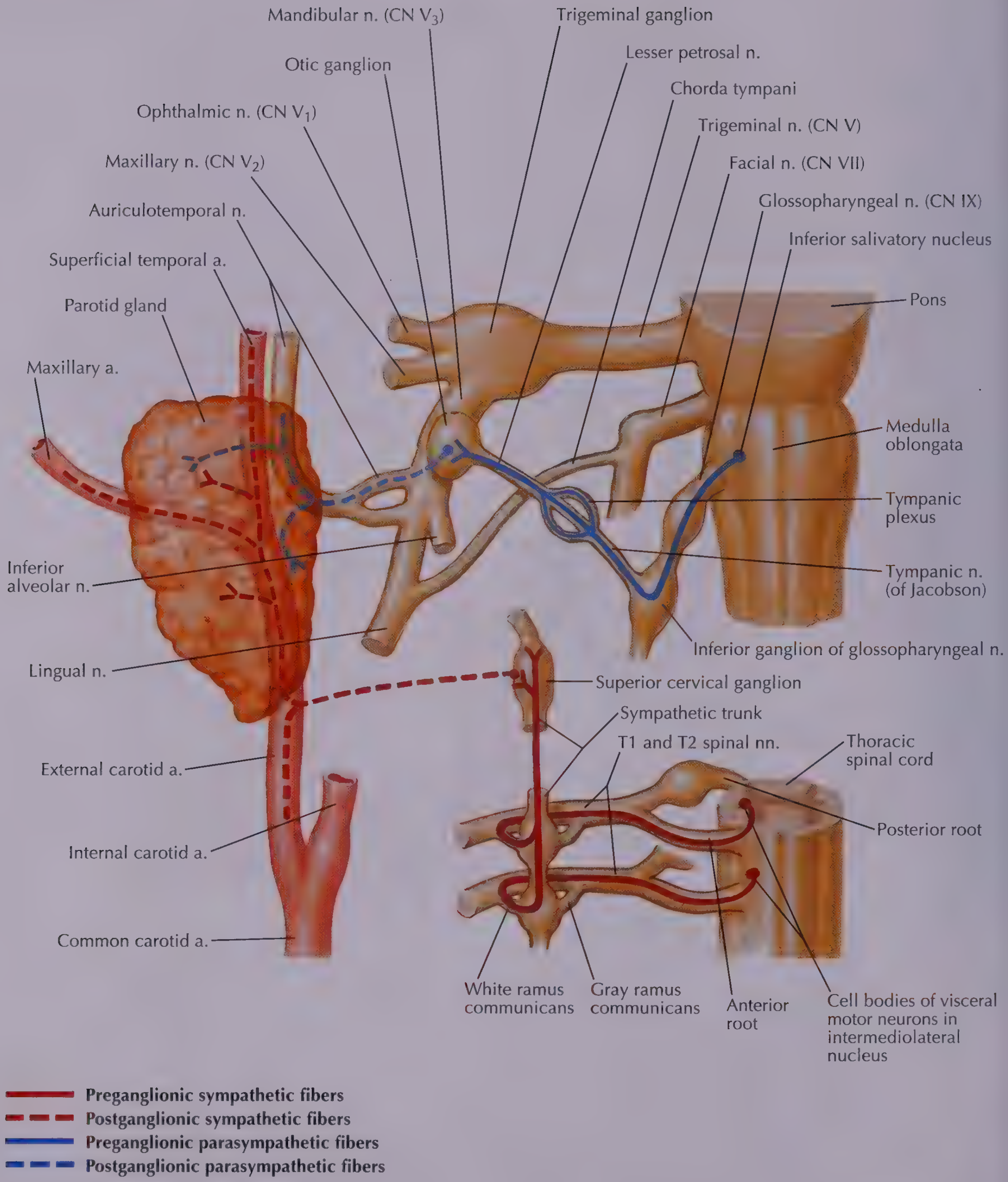
See also Plates 77, 87, 111


Ophthalmic n. (CN V1)
Mandibular n. (CN V3)
Otic ganglion
Lingual n.
Maxillary n. (CN V2)
Nerve of pterygoid canal (Vidian n.)
Pterygopalatine ganglion
Lacrimal gland
Trigeminal ganglion
Deep petrosal n.
Greater petrosal n.
Chorda tympani
Trigeminal n. (CN V)
Facial n. (CN VII)
Superior salivatory nucleus
Palatine nn.
Nasopalatine n.
Pharyngeal n.
Maxillary a.
Internal carotid n.
Glossopharyngeal n. (CN IX)
Superior cervical ganglion
Sympathetic trunk
T1 and T2 spinal nn.
Thoracic spinal cord
Posterior root
Greater palatine n.
Lesser palatine nn.
Submandibular ganglion
Sublingual gland
Submandibular gland
Facial a.
Lingual a.
External carotid plexus
External carotid a.
Common carotid a.
Internal carotid a.
White rami communicantes
Gray rami communicantes
Anterior root
Cell bodies of visceral motor neurons in intermediolateral nucleus

━━ Preganglionic sympathetic fibers
‐ ‐ ‐ Postganglionic sympathetic fibers
━━ Preganglionic parasympathetic fibers
‐ ‐ ‐ Postganglionic parasympathetic fibers

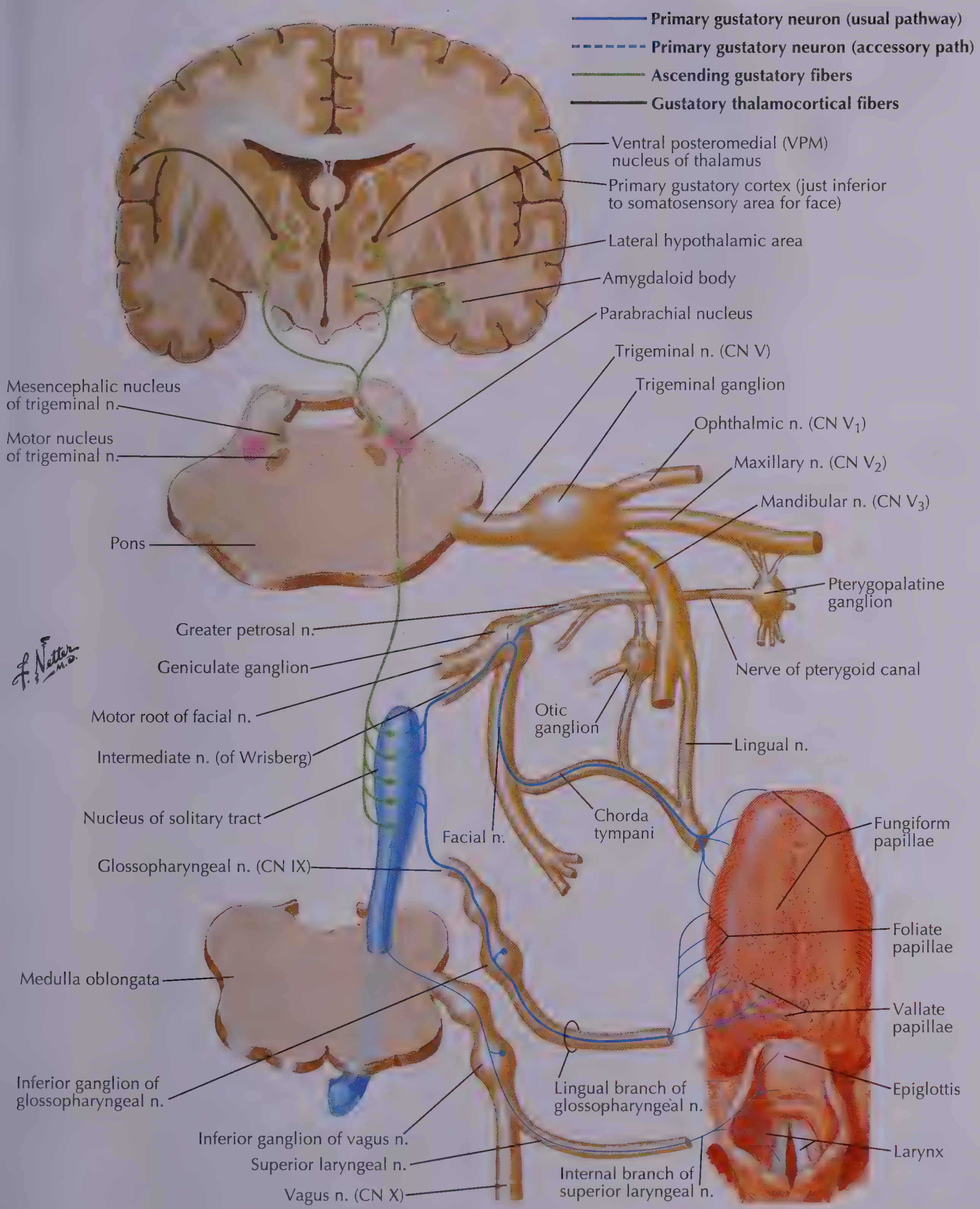
Otic Ganglion: Schema

See also Plate 77


Mandibular n. (CN V3)
Trigeminal ganglion
Lesser petrosal n.
Otic ganglion
Chorda tympani
Ophthalmic n. (CN V1)
Trigeminal n. (CN V)
Maxillary n. (CN V2)
Facial n. (CN VII)
Glossopharyngeal n. (CN IX)
Auriculotemporal n.
Inferior salivatory nucleus
Superficial temporal a.
Pons
Parotid gland
Maxillary a.
Medulla oblongata
Tympanic plexus
Inferior alveolar n.
Tympanic n. (of Jacobson)
Inferior ganglion of glossopharyngeal n.
Lingual n.
Superior cervical ganglion
Sympathetic trunk
T1 and T2 spinal nn.
Thoracic spinal cord
External carotid a.
Posterior root
Internal carotid a.
Common carotid a.
White ramus communicans
Gray ramus communicans
Anterior root
Cell bodies of visceral motor neurons in intermediolateral nucleus
Preganglionic sympathetic fibers
Postganglionic sympathetic fibers
Preganglionic parasympathetic fibers
Postganglionic parasympathetic fibers

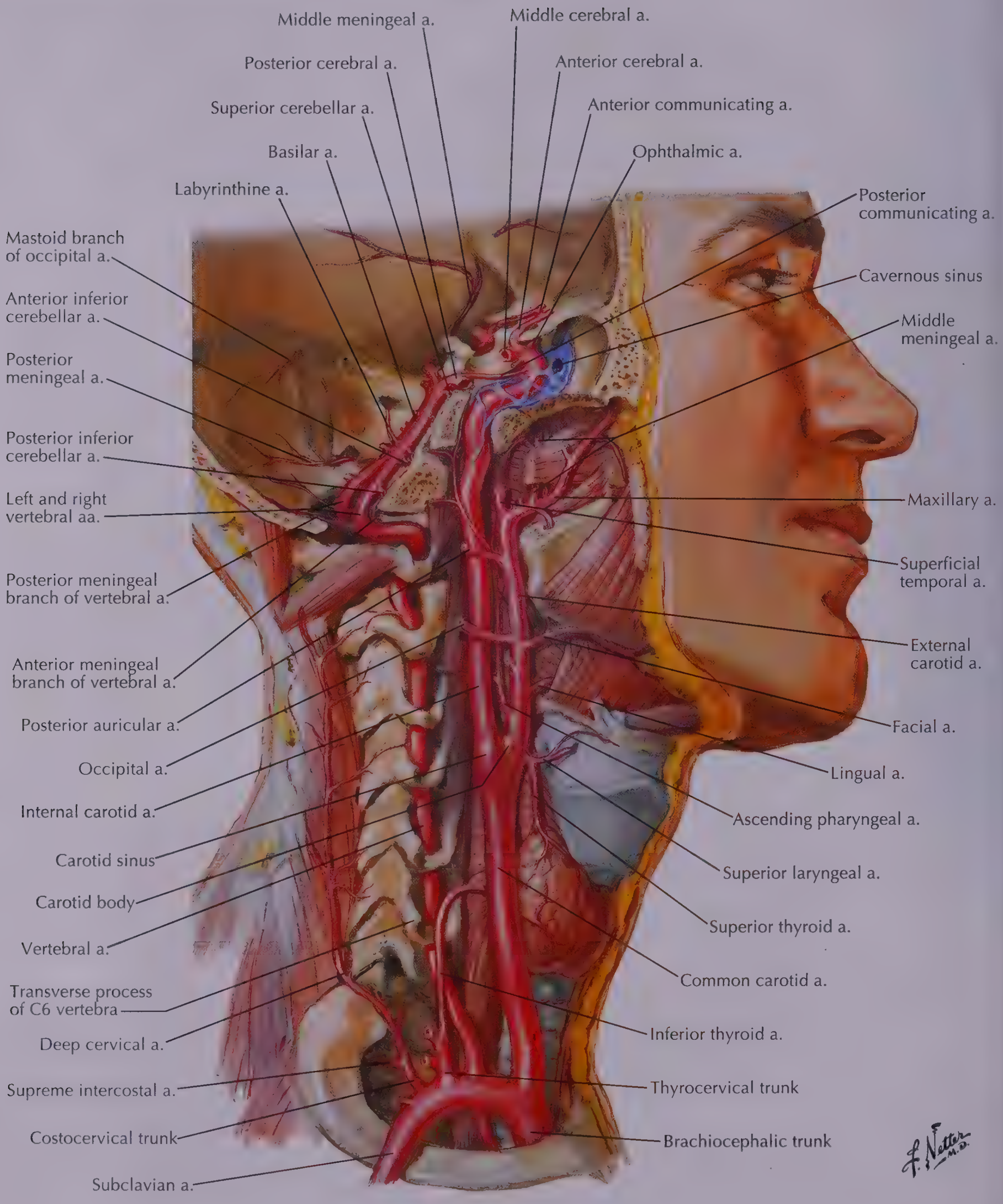
Taste Pathways: Schema

See also Plates 150, 152

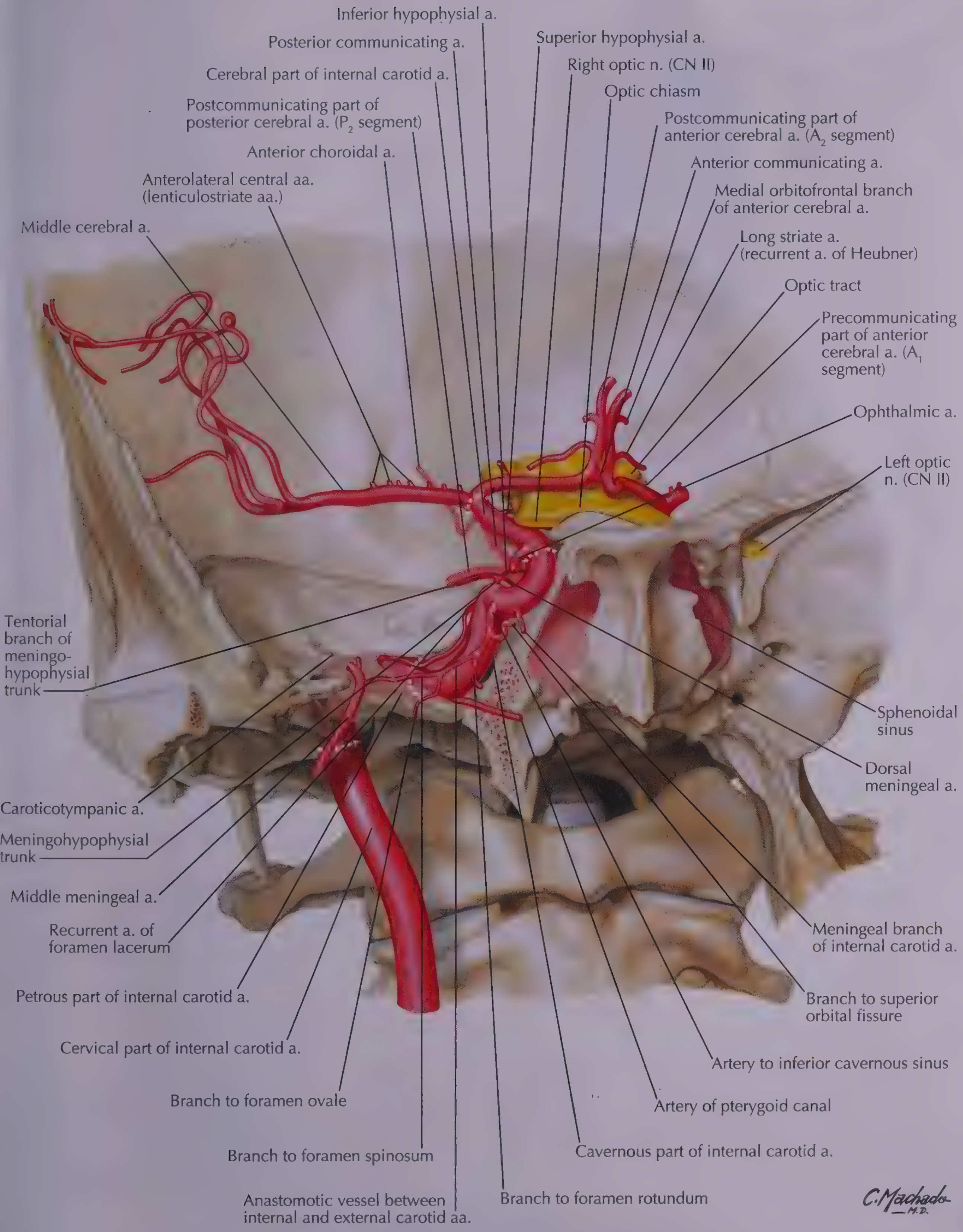

Primary gustatory neuron (usual pathway)
Primary gustatory neuron (accessory path)
Ascending gustatory fibers
Gustatory thalamocortical fibers
Ventral posteromedial (VPM) nucleus of thalamus
Primary gustatory cortex (just inferior to somatosensory area for face)
Lateral hypothalamic area
Amygdaloid body
Parabrachial nucleus
Trigeminal n. (CN V)
Trigeminal ganglion
Ophthalmic n. (CN V$_1$)
Maxillary n. (CN V$_2$)
Mandibular n. (CN V$_3$)
Pterygopalatine ganglion
Nerve of pterygoid canal
Otic ganglion
Lingual n.
Chorda tympani
Facial n.
Fungiform papillae
Foliate papillae
Vallate papillae
Epiglottis
Larynx
Lingual branch of glossopharyngeal n.
Internal branch of superior laryngeal n.
Mesencephalic nucleus of trigeminal n.
Motor nucleus of trigeminal n.
Pons
Greater petrosal n.
Geniculate ganglion
Motor root of facial n.
Intermediate n. (of Wrisberg)
Nucleus of solitary tract
Glossopharyngeal n. (CN IX)
Medulla oblongata
Inferior ganglion of glossopharyngeal n.
Inferior ganglion of vagus n.
Superior laryngeal n.
Vagus n. (CN X)
F. Netter M.D.

Arteries to Brain and Meninges

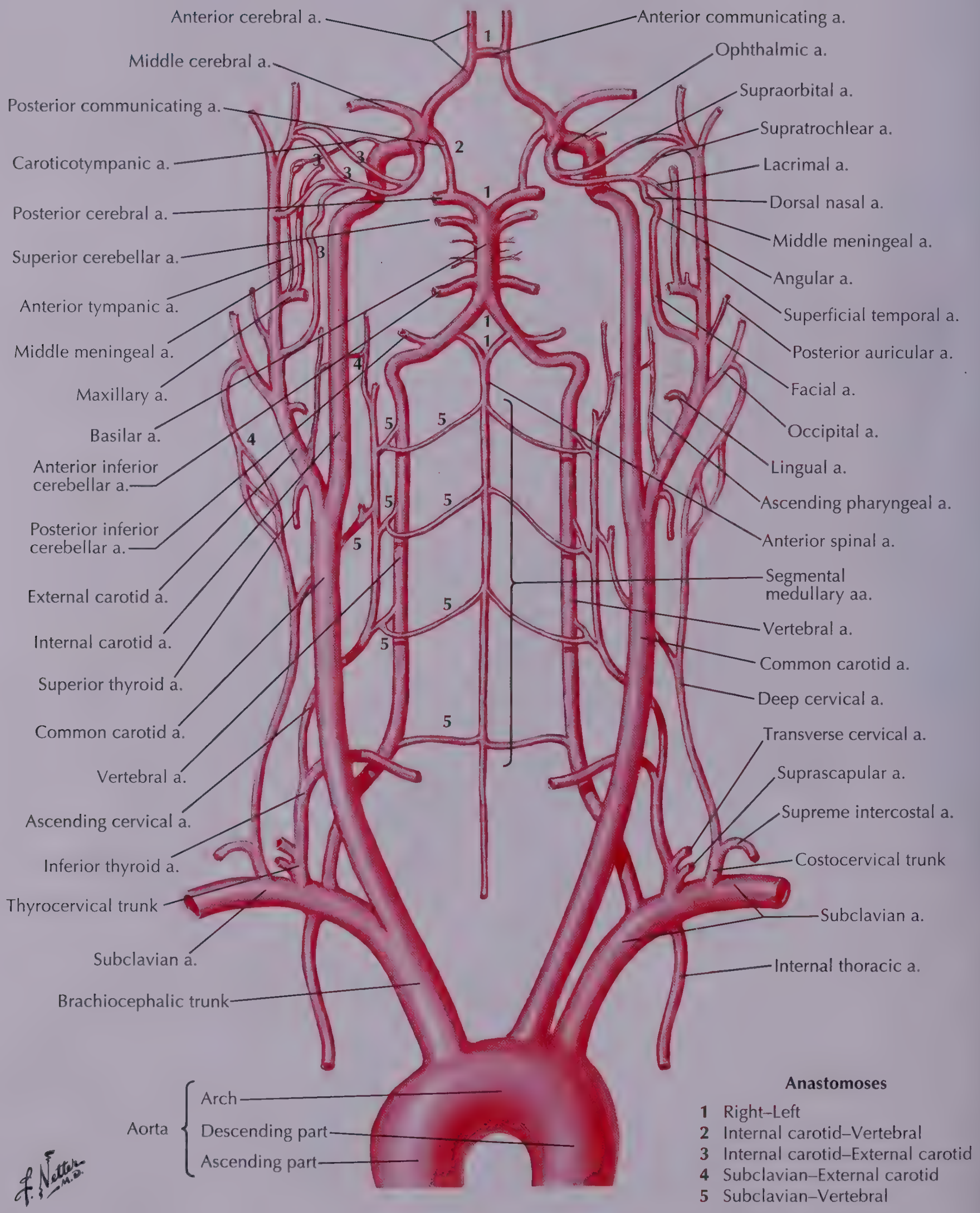
See also Plates 58, 82, 164


Middle meningeal a.
Middle cerebral a.
Posterior cerebral a.
Anterior cerebral a.
Superior cerebellar a.
Anterior communicating a.
Basilar a.
Ophthalmic a.
Labyrinthine a.
Posterior communicating a.
Mastoid branch of occipital a.
Cavernous sinus
Anterior inferior cerebellar a.
Middle meningeal a.
Posterior meningeal a.
Posterior inferior cerebellar a.
Left and right vertebral aa.
Maxillary a.
Posterior meningeal branch of vertebral a.
Superficial temporal a.
External carotid a.
Anterior meningeal branch of vertebral a.
Posterior auricular a.
Facial a.
Occipital a.
Lingual a.
Internal carotid a.
Ascending pharyngeal a.
Carotid sinus
Superior laryngeal a.
Carotid body
Superior thyroid a.
Vertebral a.
Common carotid a.
Transverse process of C6 vertebra
Deep cervical a.
Inferior thyroid a.
Supreme intercostal a.
Thyrocervical trunk
Costocervical trunk
Brachiocephalic trunk
Subclavian a.
F. Netter M.D.

See also Plates 163, 166


Inferior hypophysial a.
Posterior communicating a.
Cerebral part of internal carotid a.
Postcommunicating part of posterior cerebral a. (P_2 segment)
Anterior choroidal a.
Anterolateral central aa. (lenticulostriate aa.)
Middle cerebral a.
Superior hypophysial a.
Right optic n. (CN II)
Optic chiasm
Postcommunicating part of anterior cerebral a. (A_2 segment)
Anterior communicating a.
Medial orbitofrontal branch of anterior cerebral a.
Long striate a. (recurrent a. of Heubner)
Optic tract
Precommunicating part of anterior cerebral a. (A_1 segment)
Ophthalmic a.
Left optic n. (CN II)
Tentorial branch of meningohypophysial trunk
Sphenoidal sinus
Dorsal meningeal a.
Caroticotympanic a.
Meningohypophysial trunk
Middle meningeal a.
Recurrent a. of foramen lacerum
Petrous part of internal carotid a.
Cervical part of internal carotid a.
Branch to foramen ovale
Branch to foramen spinosum
Anastomotic vessel between internal and external carotid aa.
Meningeal branch of internal carotid a.
Branch to superior orbital fissure
Artery to inferior cavernous sinus
Artery of pterygoid canal
Cavernous part of internal carotid a.
Branch to foramen rotundum
C. Machado M.D.

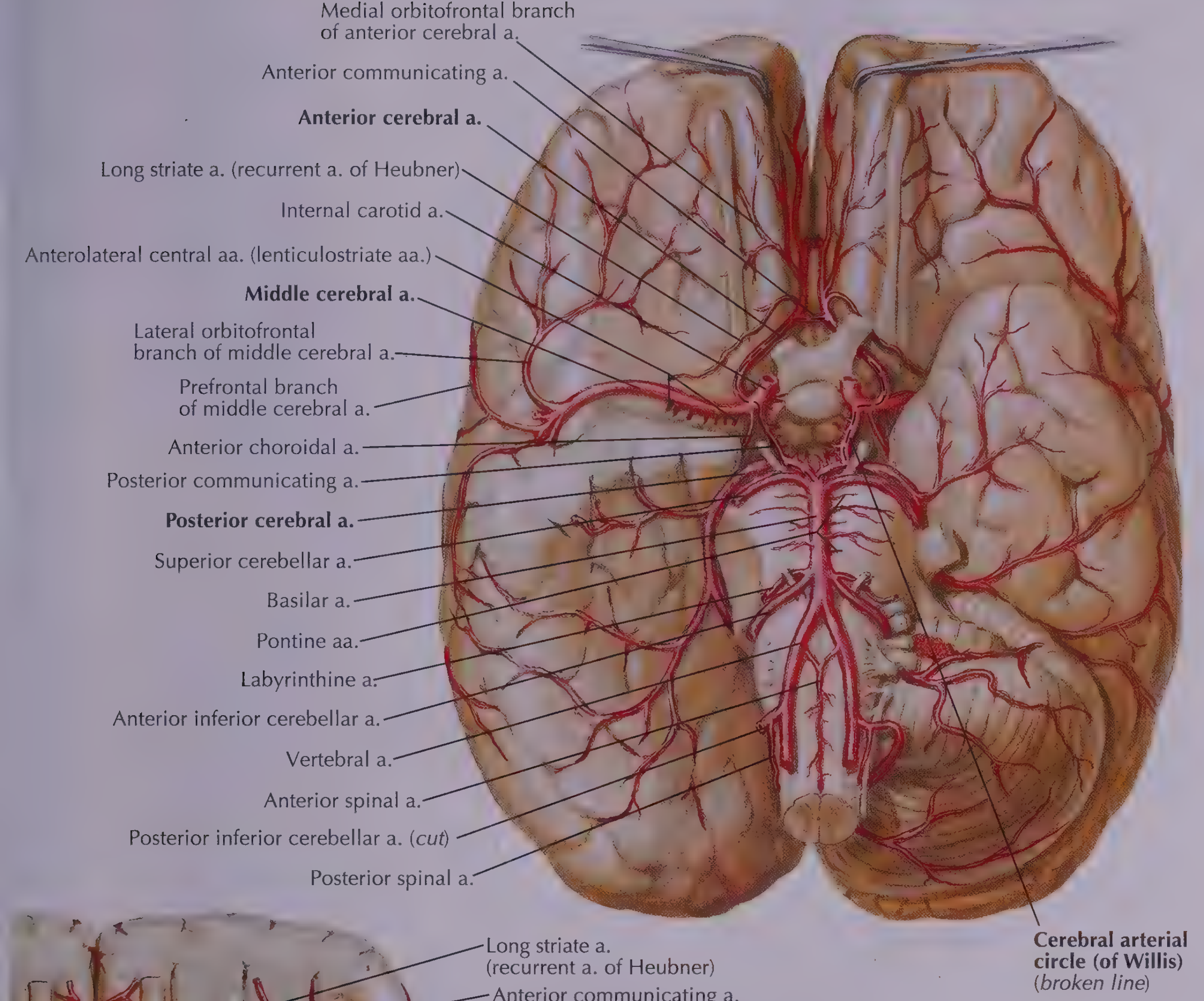
Arteries to Brain: Schema

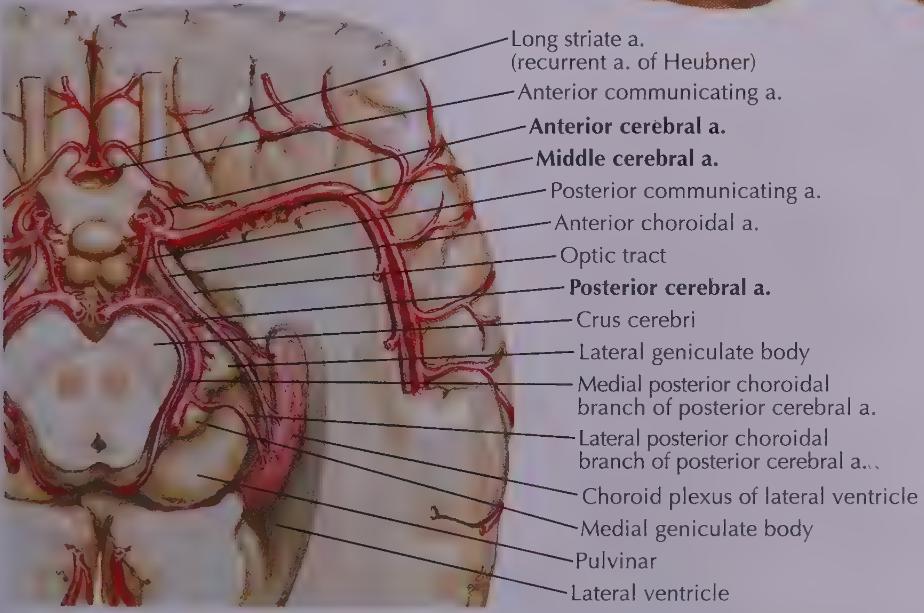

Anterior cerebral a.
Middle cerebral a.
Posterior communicating a.
Caroticotympanic a.
Posterior cerebral a.
Superior cerebellar a.
Anterior tympanic a.
Middle meningeal a.
Maxillary a.
Basilar a.
Anterior inferior cerebellar a.
Posterior inferior cerebellar a.
External carotid a.
Internal carotid a.
Superior thyroid a.
Common carotid a.
Vertebral a.
Ascending cervical a.
Inferior thyroid a.
Thyrocervical trunk
Subclavian a.
Brachiocephalic trunk
Anterior communicating a.
Ophthalmic a.
Supraorbital a.
Supratrochlear a.
Lacrimal a.
Dorsal nasal a.
Middle meningeal a.
Angular a.
Superficial temporal a.
Posterior auricular a.
Facial a.
Occipital a.
Lingual a.
Ascending pharyngeal a.
Anterior spinal a.
Segmental medullary aa.
Vertebral a.
Common carotid a.
Deep cervical a.
Transverse cervical a.
Suprascapular a.
Supreme intercostal a.
Costocervical trunk
Subclavian a.
Internal thoracic a.
Aorta
Arch
Descending part
Ascending part
1
2
3
4
5
F. Netter M.D.

Anastomoses

1 Right–Left
2 Internal carotid–Vertebral
3 Internal carotid–External carotid
4 Subclavian–External carotid
5 Subclavian–Vertebral

See also Plates 164, 167


Medial orbitofrontal branch of anterior cerebral a.
Anterior communicating a.
Anterior cerebral a.
Long striate a. (recurrent a. of Heubner)
Internal carotid a.
Anterolateral central aa. (lenticulostriate aa.)
Middle cerebral a.
Lateral orbitofrontal branch of middle cerebral a.
Prefrontal branch of middle cerebral a.
Anterior choroidal a.
Posterior communicating a.
Posterior cerebral a.
Superior cerebellar a.
Basilar a.
Pontine aa.
Labyrinthine a.
Anterior inferior cerebellar a.
Vertebral a.
Anterior spinal a.
Posterior inferior cerebellar a. (*cut*)
Posterior spinal a.
Cerebral arterial circle (of Willis)
(*broken line*)

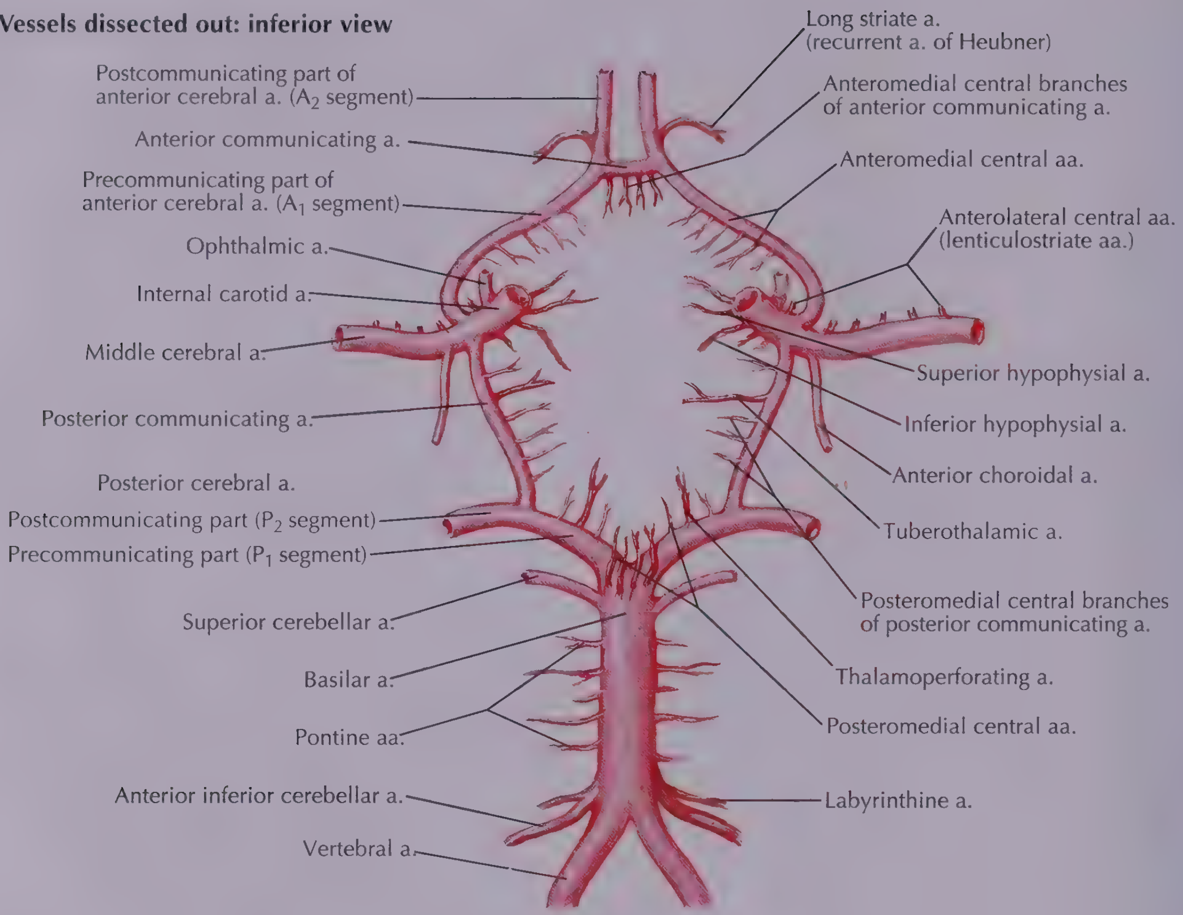

Long striate a. (recurrent a. of Heubner)
Anterior communicating a.
Anterior cerebral a.
Middle cerebral a.
Posterior communicating a.
Anterior choroidal a.
Optic tract
Posterior cerebral a.
Crus cerebri
Lateral geniculate body
Medial posterior choroidal branch of posterior cerebral a.
Lateral posterior choroidal branch of posterior cerebral a.
Choroid plexus of lateral ventricle
Medial geniculate body
Pulvinar
Lateral ventricle

F. Netter M.D.

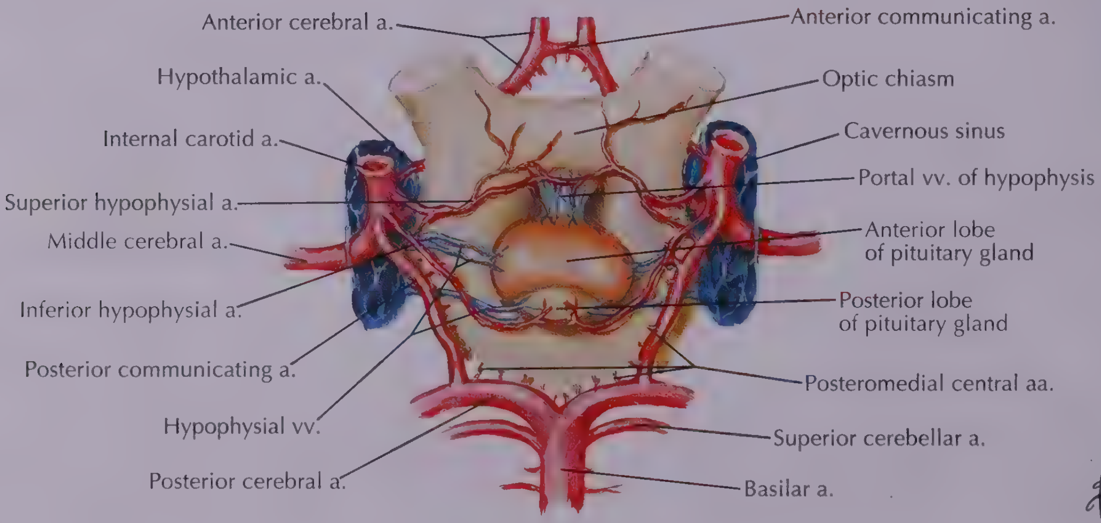
Cerebral Arterial Circle (of Willis)

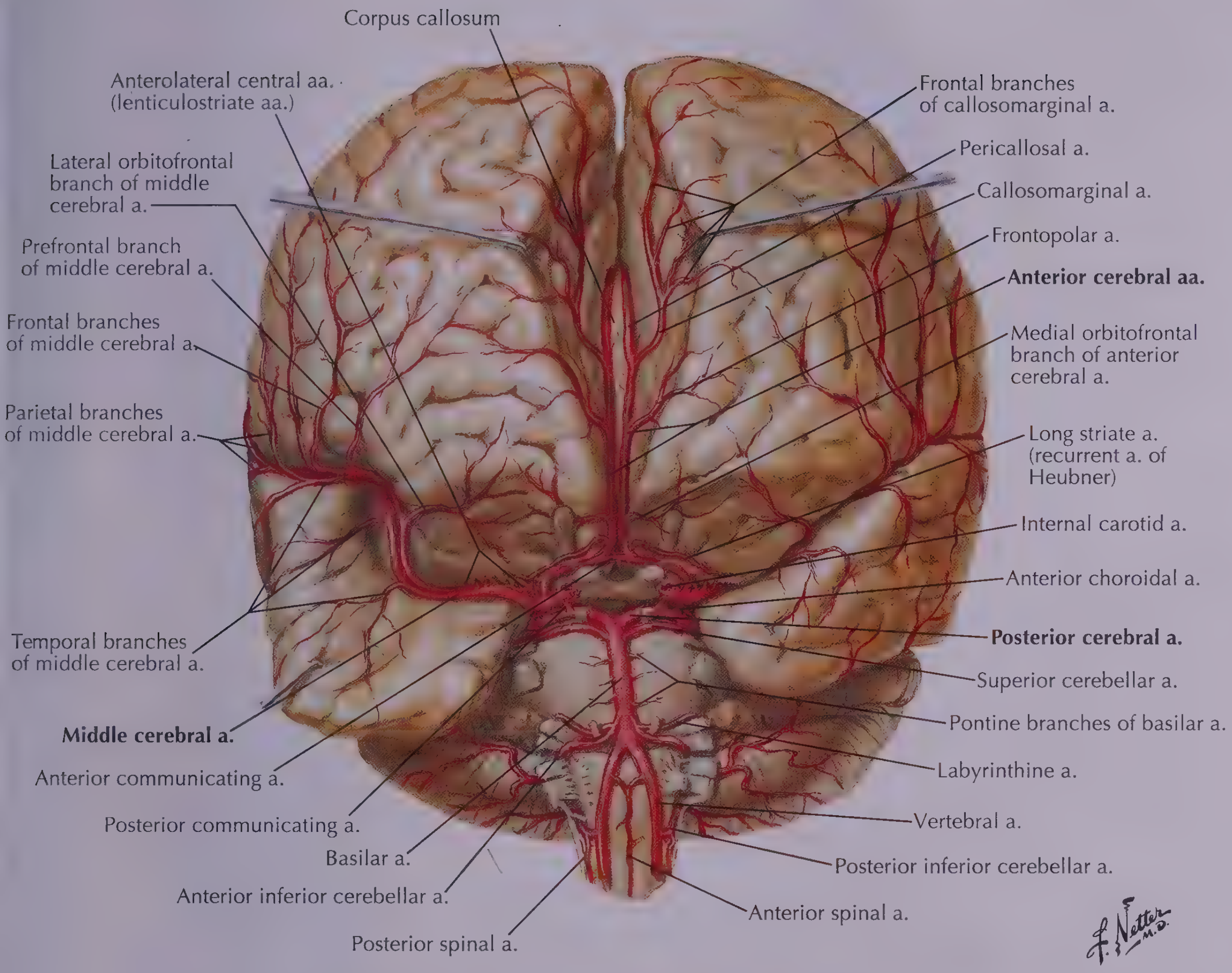
See also Plate 166

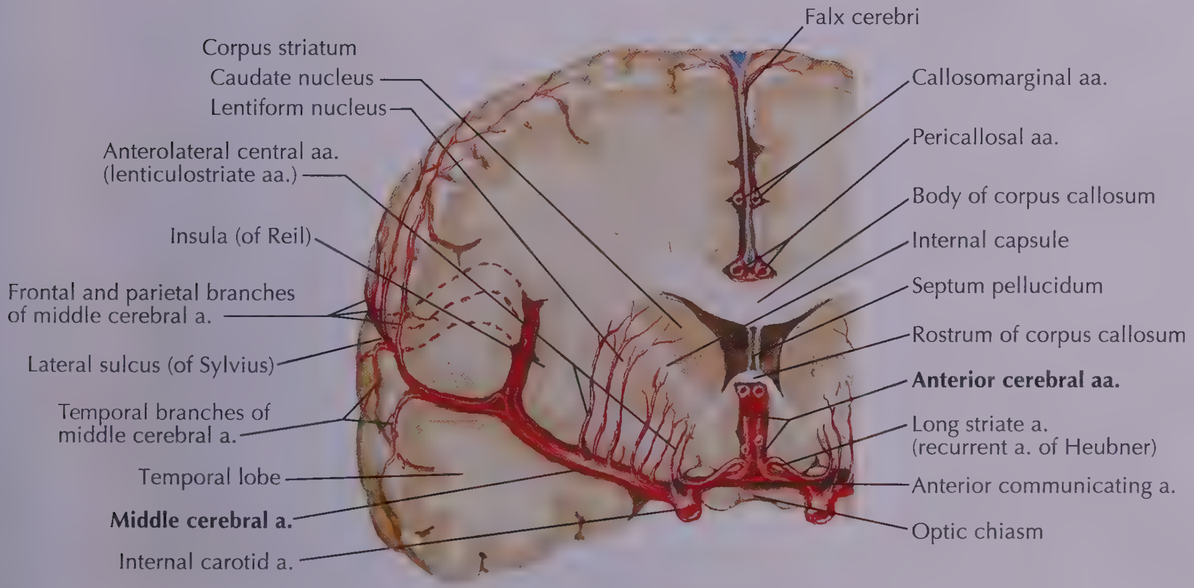
Vessels dissected out: inferior view


Postcommunicating part of anterior cerebral a. (A_2 segment)
Anterior communicating a.
Precommunicating part of anterior cerebral a. (A_1 segment)
Ophthalmic a.
Internal carotid a.
Middle cerebral a.
Posterior communicating a.
Posterior cerebral a.
Postcommunicating part (P_2 segment)
Precommunicating part (P_1 segment)
Superior cerebellar a.
Basilar a.
Pontine aa.
Anterior inferior cerebellar a.
Vertebral a.
Long striate a. (recurrent a. of Heubner)
Anteromedial central branches of anterior communicating a.
Anteromedial central aa.
Anterolateral central aa. (lenticulostriate aa.)
Superior hypophysial a.
Inferior hypophysial a.
Anterior choroidal a.
Tuberothalamic a.
Posteromedial central branches of posterior communicating a.
Thalamoperforating a.
Posteromedial central aa.
Labyrinthine a.

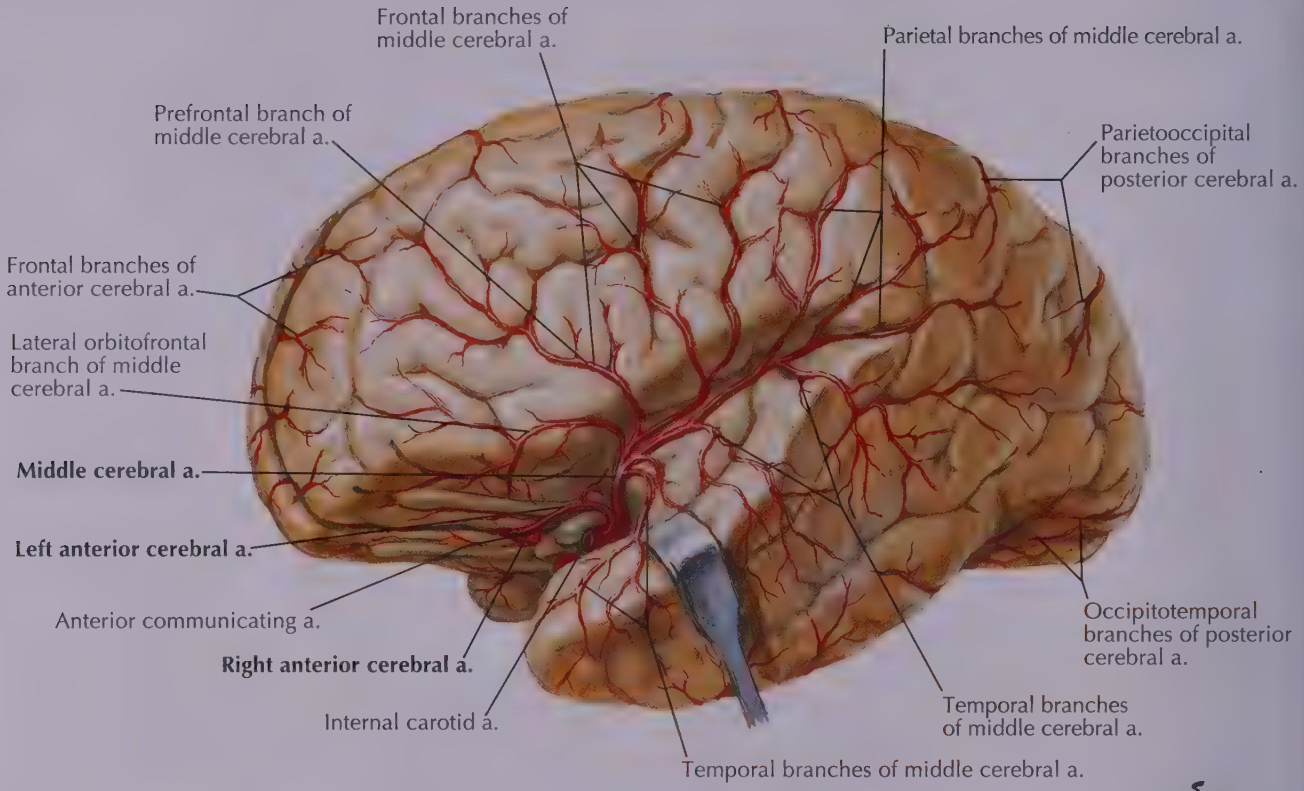
Vessels in situ: inferior view

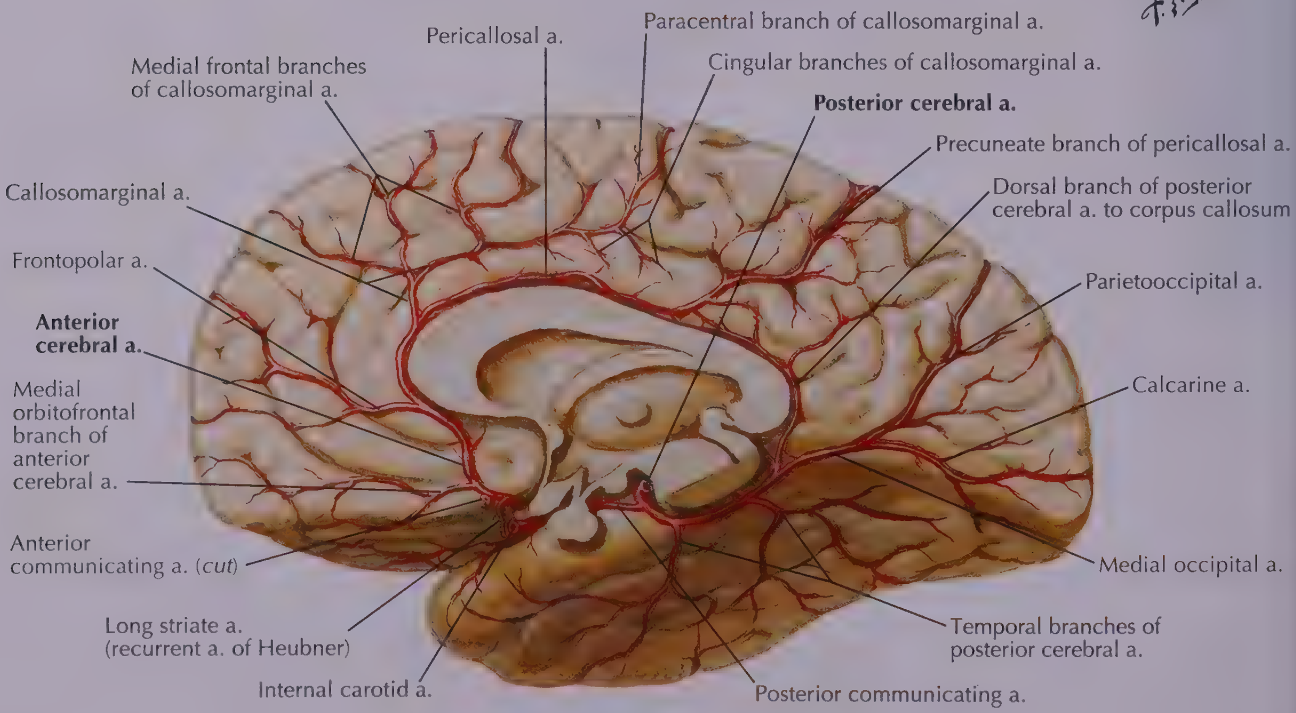

Anterior cerebral a.
Hypothalamic a.
Internal carotid a.
Superior hypophysial a.
Middle cerebral a.
Inferior hypophysial a.
Posterior communicating a.
Hypophysial vv.
Posterior cerebral a.
Anterior communicating a.
Optic chiasm
Cavernous sinus
Portal vv. of hypophysis
Anterior lobe of pituitary gland
Posterior lobe of pituitary gland
Posteromedial central aa.
Superior cerebellar a.
Basilar a.

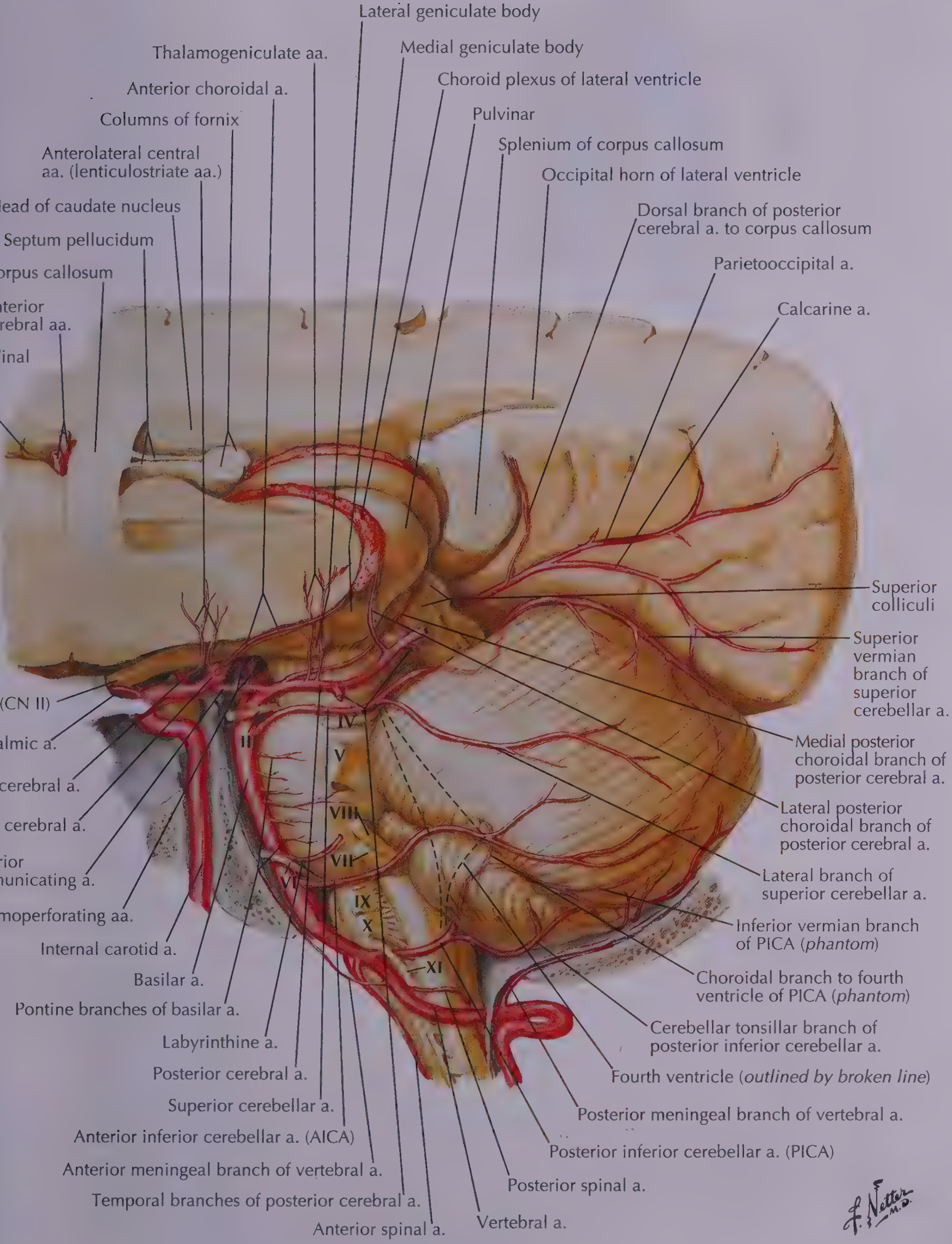

Corpus callosum
Anterolateral central aa. (lenticulostriate aa.)
Lateral orbitofrontal branch of middle cerebral a.
Prefrontal branch of middle cerebral a.
Frontal branches of middle cerebral a.
Parietal branches of middle cerebral a.
Temporal branches of middle cerebral a.
Middle cerebral a.
Anterior communicating a.
Posterior communicating a.
Basilar a.
Anterior inferior cerebellar a.
Posterior spinal a.
Frontal branches of callosomarginal a.
Pericallosal a.
Callosomarginal a.
Frontopolar a.
Anterior cerebral aa.
Medial orbitofrontal branch of anterior cerebral a.
Long striate a. (recurrent a. of Heubner)
Internal carotid a.
Anterior choroidal a.
Posterior cerebral a.
Superior cerebellar a.
Pontine branches of basilar a.
Labyrinthine a.
Vertebral a.
Posterior inferior cerebellar a.
Anterior spinal a.
F. Netter M.D.


Corpus striatum
Caudate nucleus
Lentiform nucleus
Anterolateral central aa. (lenticulostriate aa.)
Insula (of Reil)
Frontal and parietal branches of middle cerebral a.
Lateral sulcus (of Sylvius)
Temporal branches of middle cerebral a.
Temporal lobe
Middle cerebral a.
Internal carotid a.
Falx cerebri
Callosomarginal aa.
Pericallosal aa.
Body of corpus callosum
Internal capsule
Septum pellucidum
Rostrum of corpus callosum
Anterior cerebral aa.
Long striate a. (recurrent a. of Heubner)
Anterior communicating a.
Optic chiasm

Arteries of Brain: Lateral and Medial Views

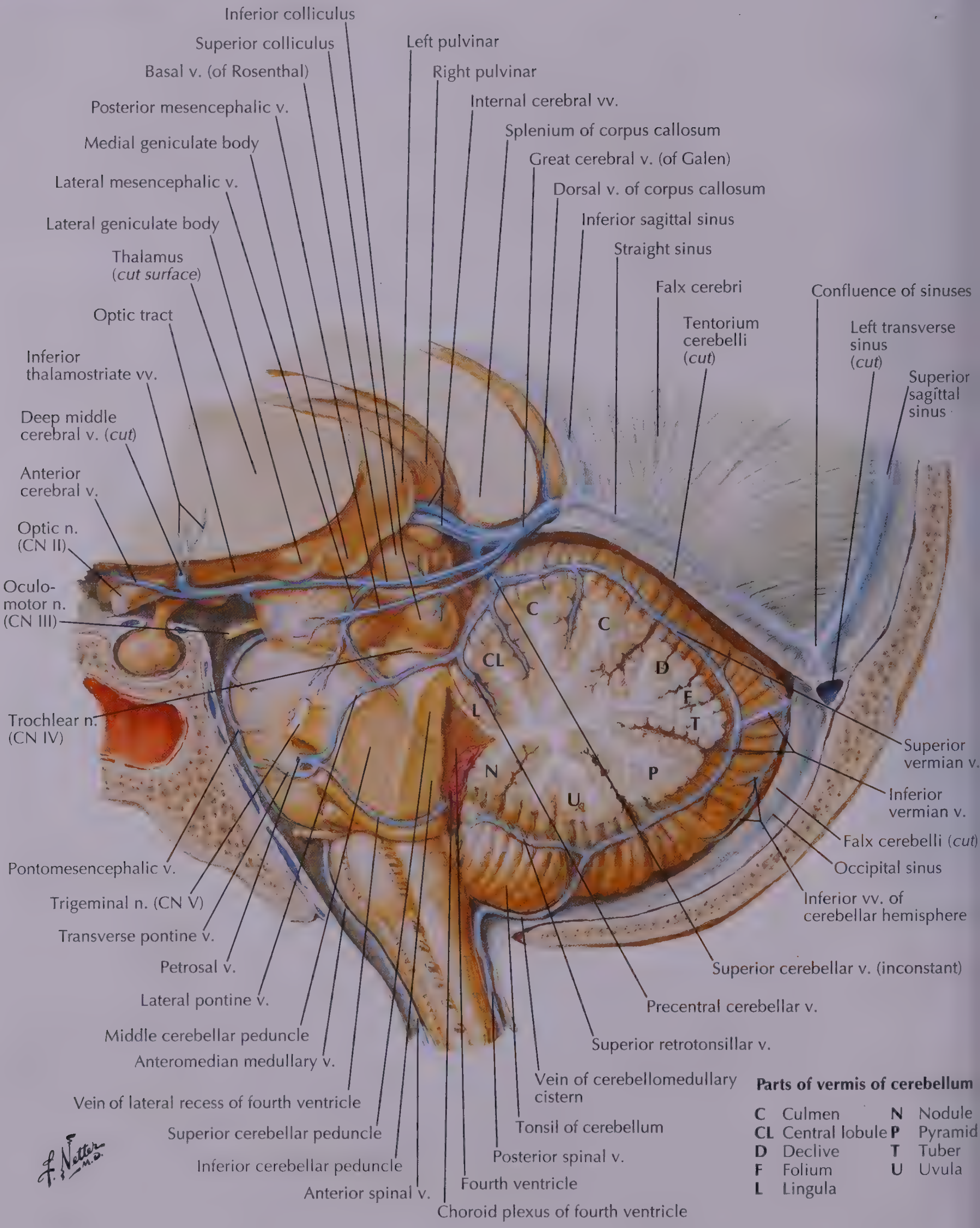

Frontal branches of middle cerebral a.
Parietal branches of middle cerebral a.
Prefrontal branch of middle cerebral a.
Parietooccipital branches of posterior cerebral a.
Frontal branches of anterior cerebral a.
Lateral orbitofrontal branch of middle cerebral a.
Middle cerebral a.
Left anterior cerebral a.
Anterior communicating a.
Right anterior cerebral a.
Internal carotid a.
Occipitotemporal branches of posterior cerebral a.
Temporal branches of middle cerebral a.
Temporal branches of middle cerebral a.


Pericallosal a.
Paracentral branch of callosomarginal a.
Medial frontal branches of callosomarginal a.
Cingular branches of callosomarginal a.
Posterior cerebral a.
Precuneate branch of pericallosal a.
Callosomarginal a.
Dorsal branch of posterior cerebral a. to corpus callosum
Frontopolar a.
Parietooccipital a.
Anterior cerebral a.
Calcarine a.
Medial orbitofrontal branch of anterior cerebral a.
Anterior communicating a. (cut)
Medial occipital a.
Long striate a. (recurrent a. of Heubner)
Temporal branches of posterior cerebral a.
Internal carotid a.
Posterior communicating a.


Lateral geniculate body
Thalamogeniculate aa.
Medial geniculate body
Anterior choroidal a.
Choroid plexus of lateral ventricle
Columns of fornix
Pulvinar
Anterolateral central aa. (lenticulostriate aa.)
Splenium of corpus callosum
Occipital horn of lateral ventricle
Head of caudate nucleus
Dorsal branch of posterior cerebral a. to corpus callosum
Septum pellucidum
Parietooccipital a.
Corpus callosum
Calcarine a.
Anterior cerebral aa.
Longitudinal cerebral issure
Superior colliculi
Superior vermian branch of superior cerebellar a.
ptic n. (CN II)
Ophthalmic a.
Medial posterior choroidal branch of posterior cerebral a.
nterior cerebral a.
Middle cerebral a.
Lateral posterior choroidal branch of posterior cerebral a.
Posterior communicating a.
Lateral branch of superior cerebellar a.
Thalamoperforating aa.
Inferior vermian branch of PICA (*phantom*)
Internal carotid a.
Choroidal branch to fourth ventricle of PICA (*phantom*)
Basilar a.
Pontine branches of basilar a.
Cerebellar tonsillar branch of posterior inferior cerebellar a.
Labyrinthine a.
Fourth ventricle (*outlined by broken line*)
Posterior cerebral a.
Posterior meningeal branch of vertebral a.
Superior cerebellar a.
Anterior inferior cerebellar a. (AICA)
Posterior inferior cerebellar a. (PICA)
Anterior meningeal branch of vertebral a.
Posterior spinal a.
Temporal branches of posterior cerebral a.
Anterior spinal a.
Vertebral a.
II
IV
V
VIII
VII
VI
IX
X
XI
F. Netter M.D.

Veins of Posterior Cranial Fossa

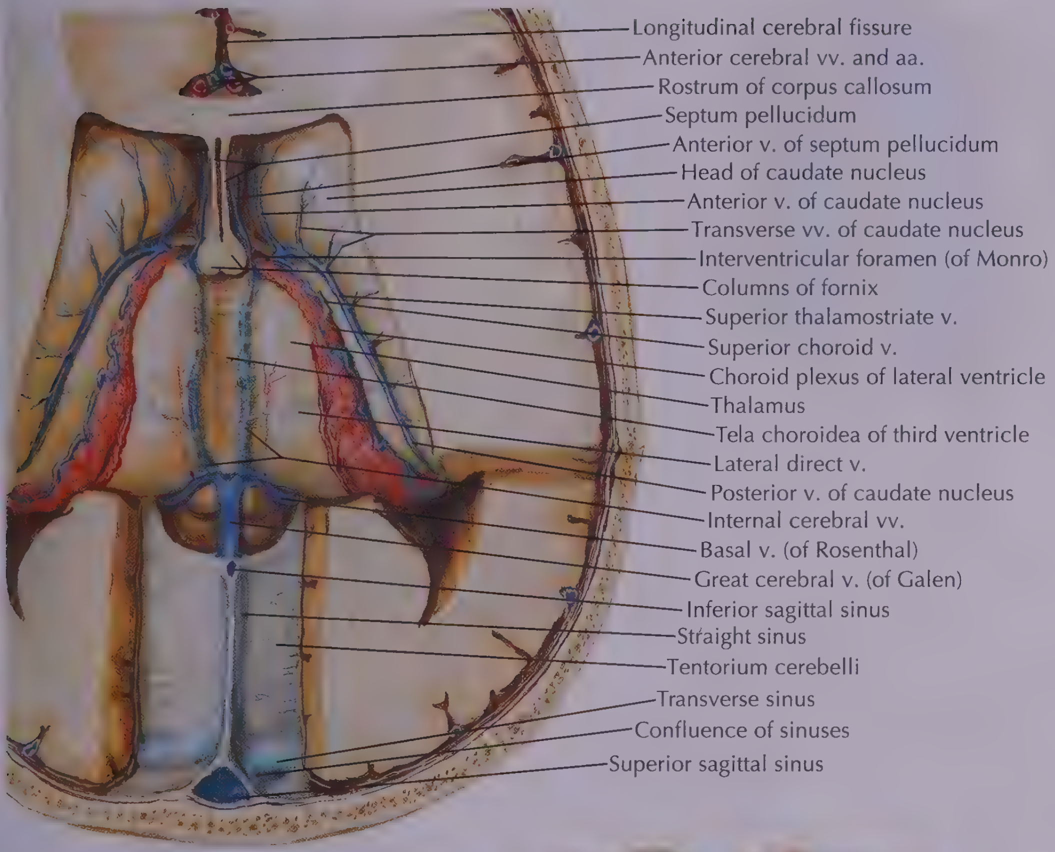
See also Plate 173


Inferior colliculus
Superior colliculus
Basal v. (of Rosenthal)
Posterior mesencephalic v.
Medial geniculate body
Lateral mesencephalic v.
Lateral geniculate body
Thalamus (*cut surface*)
Optic tract
Inferior thalamostriate vv.
Deep middle cerebral v. (*cut*)
Anterior cerebral v.
Optic n. (CN II)
Oculomotor n. (CN III)
Trochlear n. (CN IV)
Pontomesencephalic v.
Trigeminal n. (CN V)
Transverse pontine v.
Petrosal v.
Lateral pontine v.
Middle cerebellar peduncle
Anteromedian medullary v.
Vein of lateral recess of fourth ventricle
Superior cerebellar peduncle
Inferior cerebellar peduncle
Anterior spinal v.
Left pulvinar
Right pulvinar
Internal cerebral vv.
Splenium of corpus callosum
Great cerebral v. (of Galen)
Dorsal v. of corpus callosum
Inferior sagittal sinus
Straight sinus
Falx cerebri
Tentorium cerebelli (*cut*)
Confluence of sinuses
Left transverse sinus (*cut*)
Superior sagittal sinus
C
C
CL
D
F
T
L
N
P
U
Superior vermian v.
Inferior vermian v.
Falx cerebelli (*cut*)
Occipital sinus
Inferior vv. of cerebellar hemisphere
Superior cerebellar v. (inconstant)
Precentral cerebellar v.
Superior retrotonsillar v.
Vein of cerebellomedullary cistern
Tonsil of cerebellum
Posterior spinal v.
Fourth ventricle
Choroid plexus of fourth ventricle
F. Netter M.D.

Parts of vermis of cerebellum

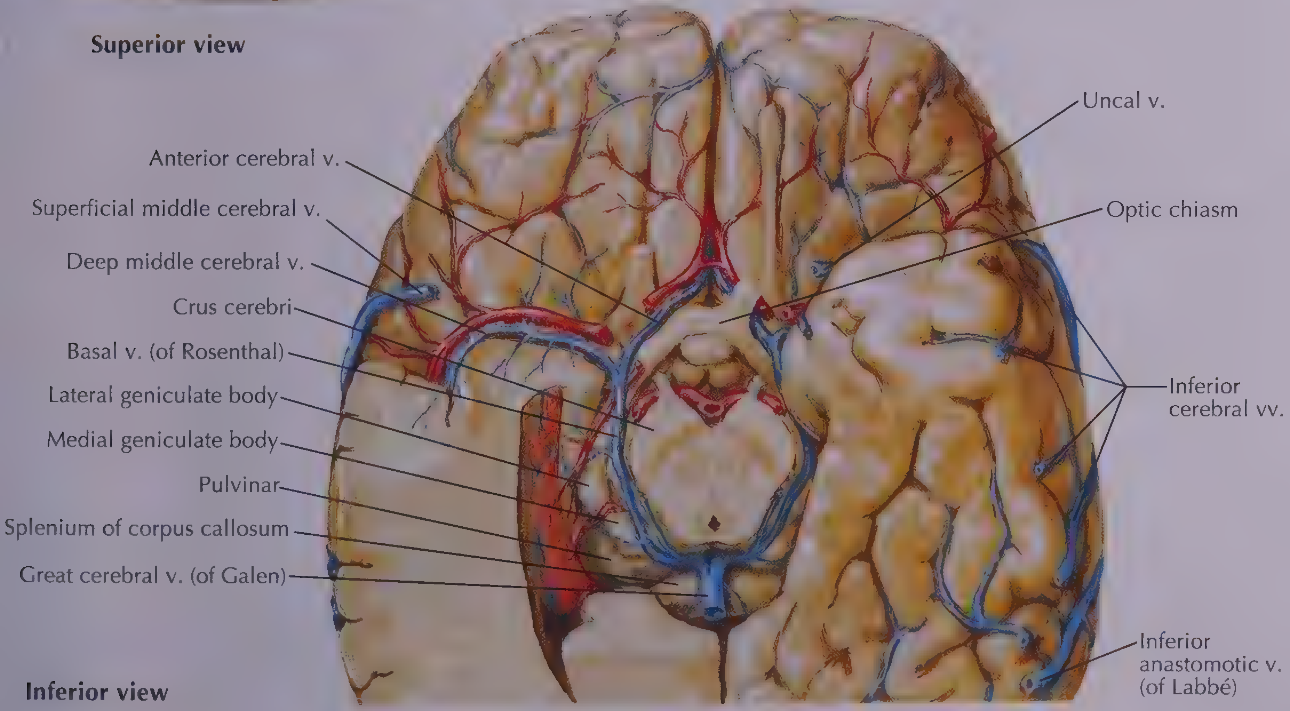
C	Culmen	N	Nodule
CL	Central lobule	P	Pyramid
D	Declive	T	Tuber
F	Folium	U	Uvula
L	Lingula		

For superficial veins of brain see Plates 138, 173


Longitudinal cerebral fissure
Anterior cerebral vv. and aa.
Rostrum of corpus callosum
Septum pellucidum
Anterior v. of septum pellucidum
Head of caudate nucleus
Anterior v. of caudate nucleus
Transverse vv. of caudate nucleus
Interventricular foramen (of Monro)
Columns of fornix
Superior thalamostriate v.
Superior choroid v.
Choroid plexus of lateral ventricle
Thalamus
Tela choroidea of third ventricle
Lateral direct v.
Posterior v. of caudate nucleus
Internal cerebral vv.
Basal v. (of Rosenthal)
Great cerebral v. (of Galen)
Inferior sagittal sinus
Straight sinus
Tentorium cerebelli
Transverse sinus
Confluence of sinuses
Superior sagittal sinus

F. Netter M.D.

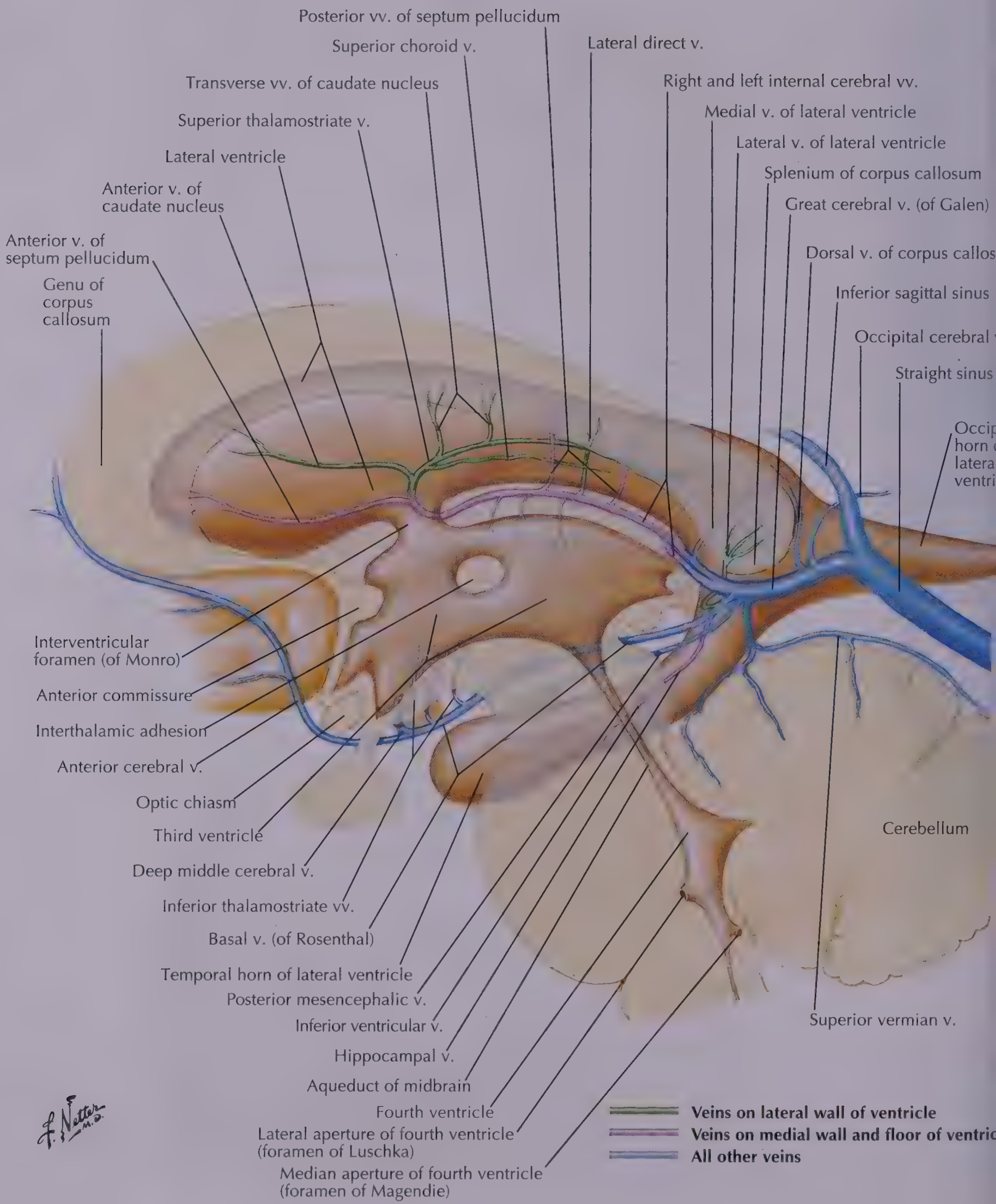
Superior view


Uncal v.
Anterior cerebral v.
Optic chiasm
Superficial middle cerebral v.
Deep middle cerebral v.
Crus cerebri
Basal v. (of Rosenthal)
Inferior cerebral vv.
Lateral geniculate body
Medial geniculate body
Pulvinar
Splenium of corpus callosum
Great cerebral v. (of Galen)
Inferior anastomotic v. (of Labbé)

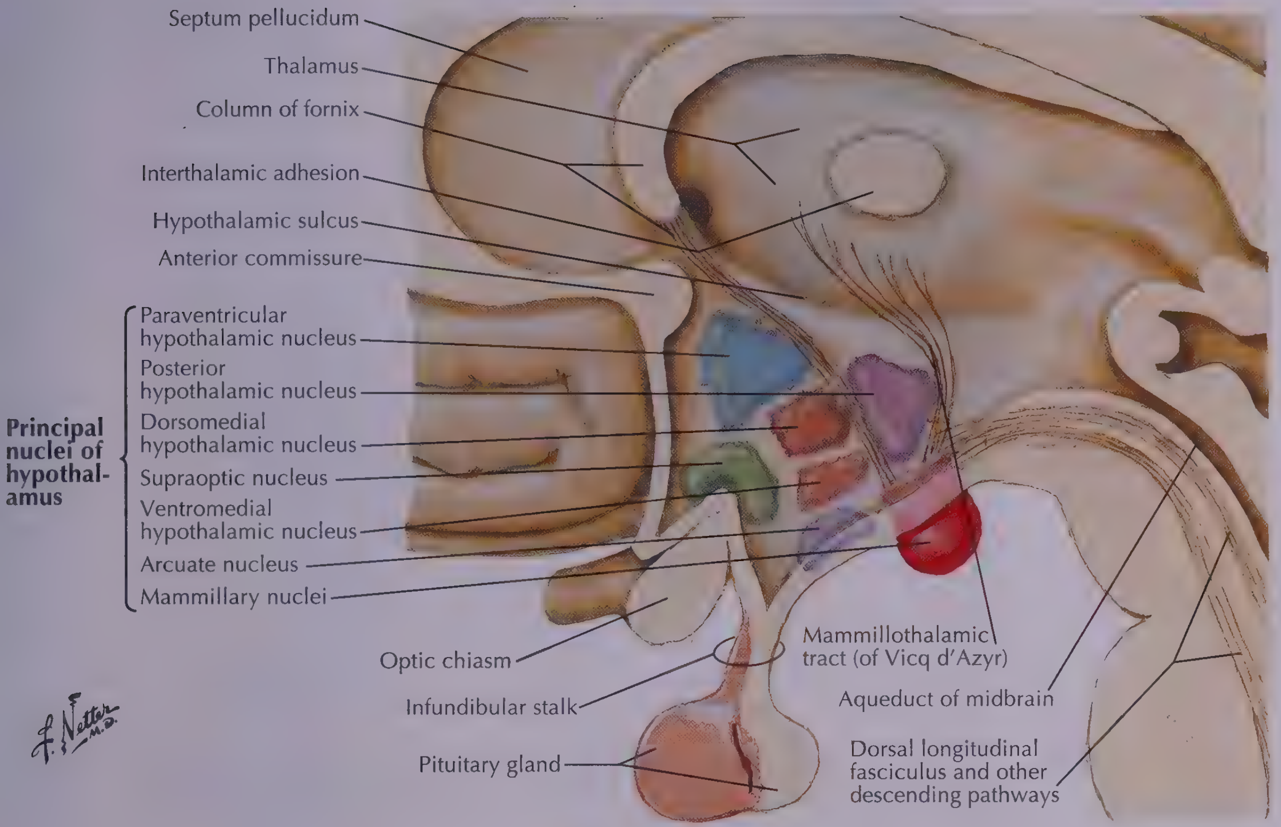
Inferior view

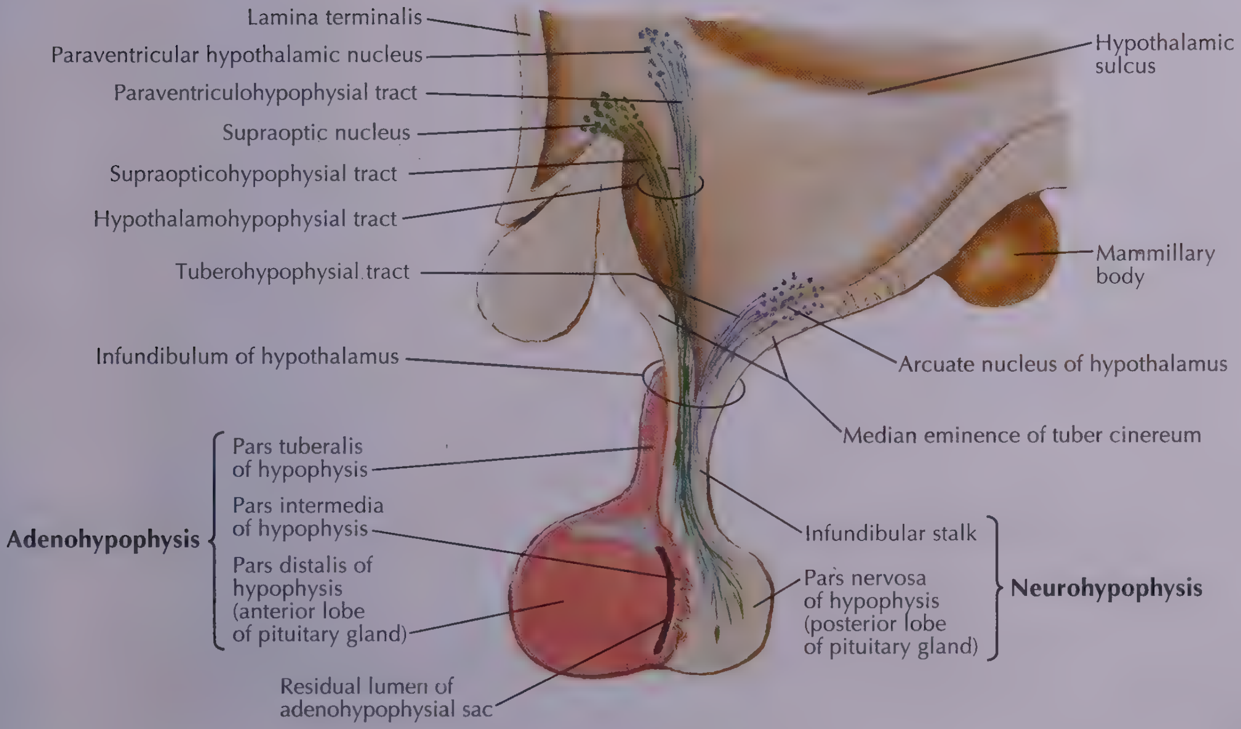
Subependymal Veins of Brain

See also Plate 171

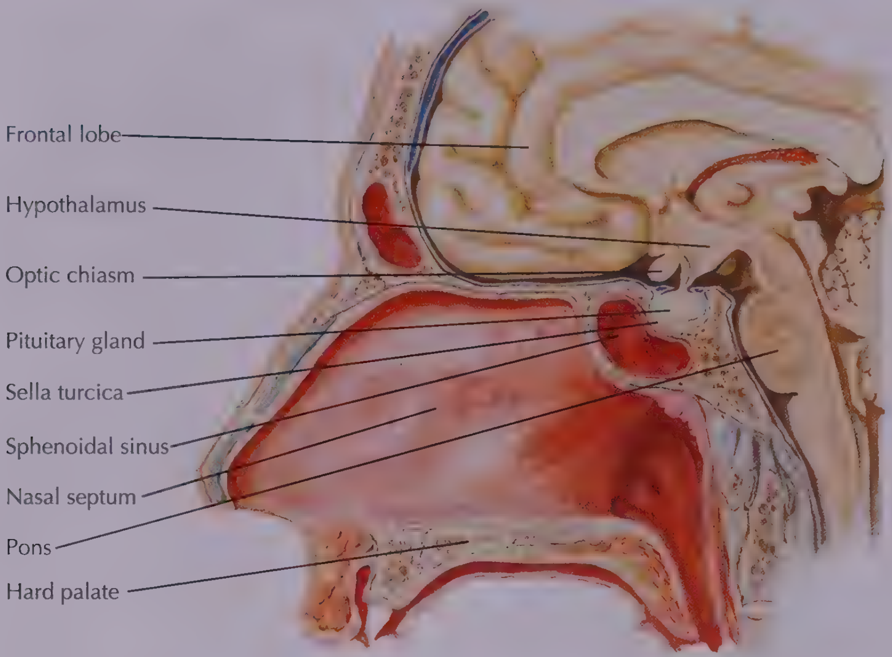

Posterior vv. of septum pellucidum
Superior choroid v.
Lateral direct v.
Transverse vv. of caudate nucleus
Right and left internal cerebral vv.
Superior thalamostriate v.
Medial v. of lateral ventricle
Lateral v. of lateral ventricle
Lateral ventricle
Splenium of corpus callosum
Anterior v. of caudate nucleus
Great cerebral v. (of Galen)
Anterior v. of septum pellucidum
Dorsal v. of corpus callos
Genu of corpus callosum
Inferior sagittal sinus
Occipital cerebral
Straight sinus
Occip horn latera ventri
Interventricular foramen (of Monro)
Anterior commissure
Interthalamic adhesion
Anterior cerebral v.
Optic chiasm
Third ventricle
Cerebellum
Deep middle cerebral v.
Inferior thalamostriate vv.
Basal v. (of Rosenthal)
Temporal horn of lateral ventricle
Posterior mesencephalic v.
Inferior ventricular v.
Superior vermian v.
Hippocampal v.
Aqueduct of midbrain
Fourth ventricle
Lateral aperture of fourth ventricle (foramen of Luschka)
Median aperture of fourth ventricle (foramen of Magendie)
Veins on lateral wall of ventricle
Veins on medial wall and floor of ventric
All other veins

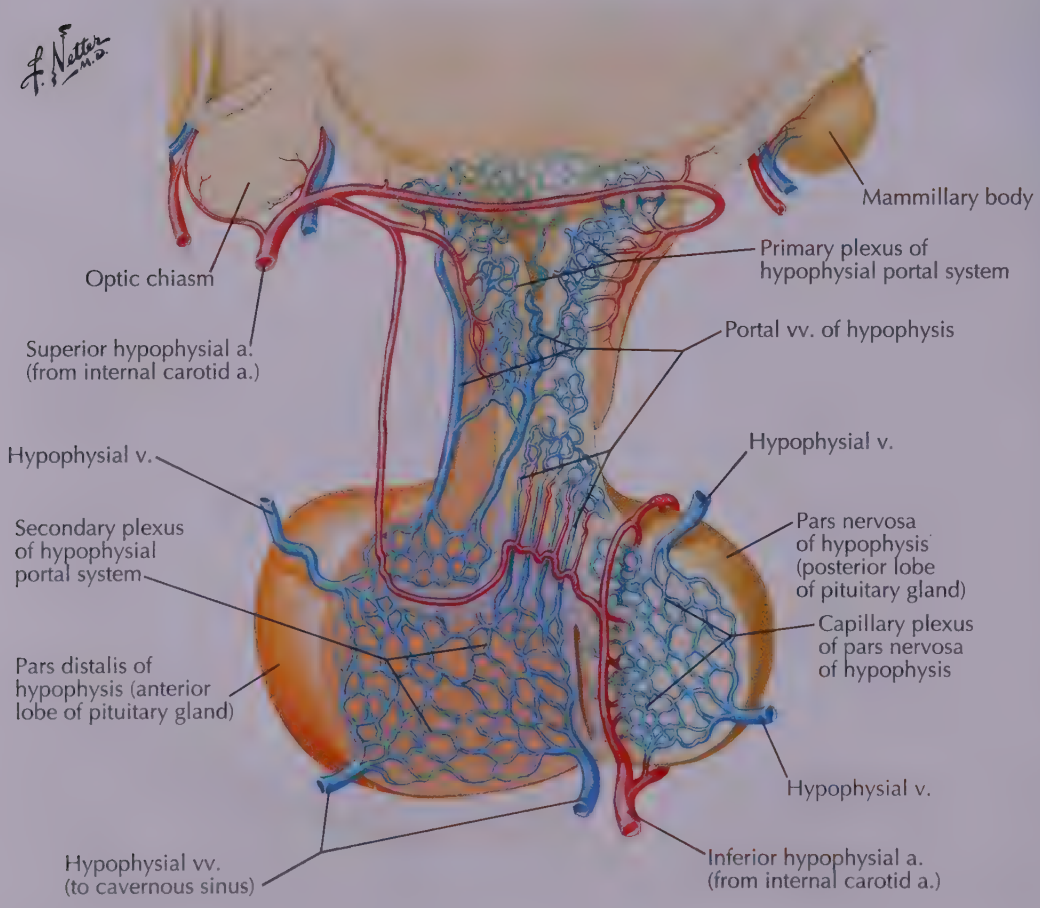
See also Plate 133


Septum pellucidum
Thalamus
Column of fornix
Interthalamic adhesion
Hypothalamic sulcus
Anterior commissure
Principal nuclei of hypothalamus
Paraventricular hypothalamic nucleus
Posterior hypothalamic nucleus
Dorsomedial hypothalamic nucleus
Supraoptic nucleus
Ventromedial hypothalamic nucleus
Arcuate nucleus
Mammillary nuclei
Optic chiasm
Infundibular stalk
Pituitary gland
Mammillothalamic tract (of Vicq d'Azyr)
Aqueduct of midbrain
Dorsal longitudinal fasciculus and other descending pathways
F. Netter M.D.


Lamina terminalis
Paraventricular hypothalamic nucleus
Paraventriculohypophysial tract
Supraoptic nucleus
Supraopticohypophysial tract
Hypothalamohypophysial tract
Tuberohypophysial tract
Infundibulum of hypothalamus
Adenohypophysis
Pars tuberalis of hypophysis
Pars intermedia of hypophysis
Pars distalis of hypophysis (anterior lobe of pituitary gland)
Residual lumen of adenohypophysial sac
Hypothalamic sulcus
Mammillary body
Arcuate nucleus of hypothalamus
Median eminence of tuber cinereum
Infundibular stalk
Pars nervosa of hypophysis (posterior lobe of pituitary gland)
Neurohypophysis

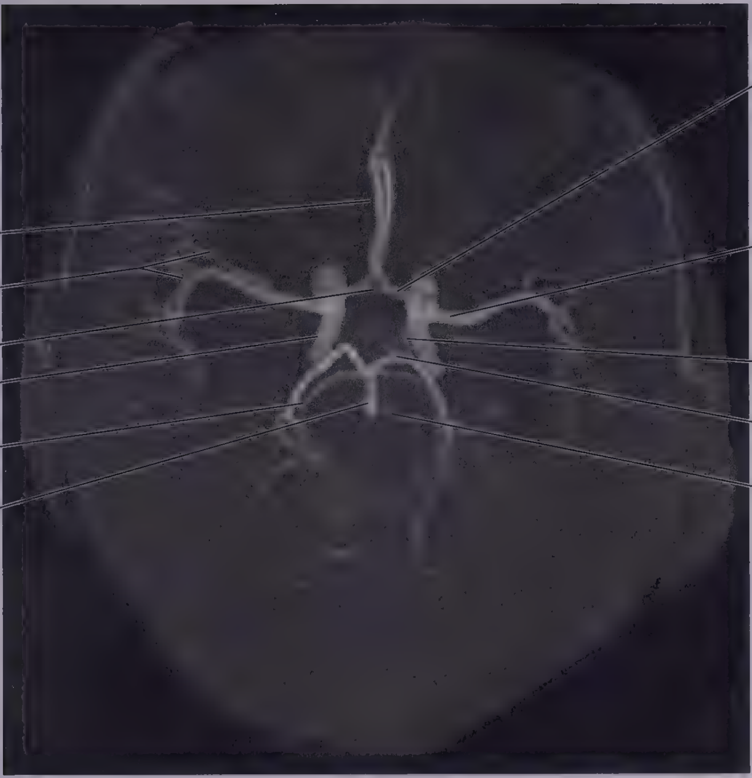
Vasculature of Hypothalamus and Hypophysis


Frontal lobe
Hypothalamus
Optic chiasm
Pituitary gland
Sella turcica
Sphenoidal sinus
Nasal septum
Pons
Hard palate

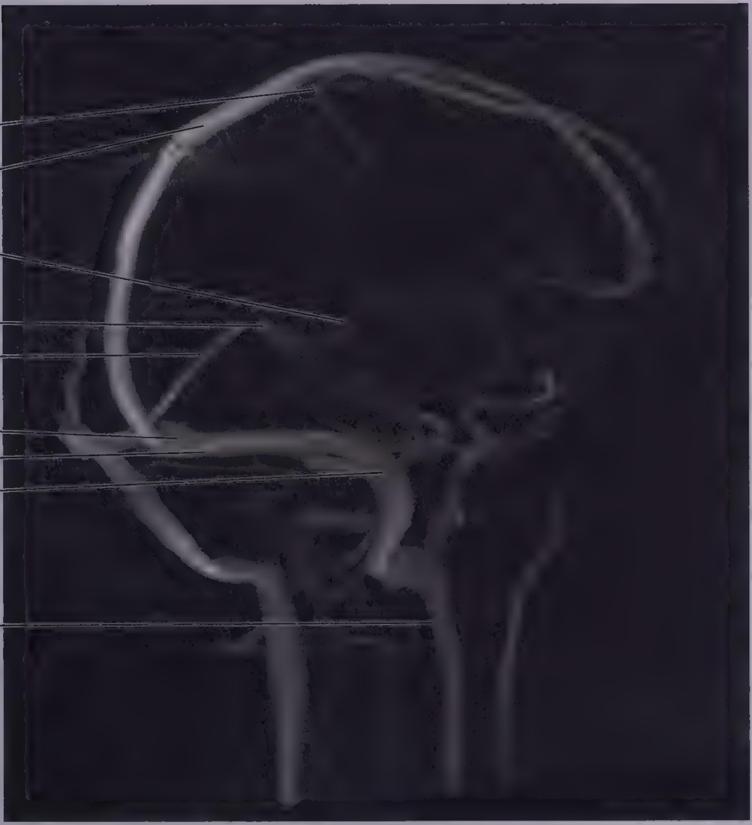

f. Netter M.D.
Mammillary body
Optic chiasm
Primary plexus of hypophysial portal system
Superior hypophysial a. (from internal carotid a.)
Portal vv. of hypophysis
Hypophysial v.
Hypophysial v.
Secondary plexus of hypophysial portal system
Pars nervosa of hypophysis (posterior lobe of pituitary gland)
Capillary plexus of pars nervosa of hypophysis
Pars distalis of hypophysis (anterior lobe of pituitary gland)
Hypophysial v.
Hypophysial vv. (to cavernous sinus)
Inferior hypophysial a. (from internal carotid a.)

See also Plate BP 31

Magnetic resonance angiography (MRA) at level of cerebral arterial circle (3D time-of-flight image without contrast)


Postcommunicating part of anterior cerebral a. (A2 segment)
Middle cerebral a. (M2 segments)
Anterior communicating a.
Internal carotid a.
Superior cerebellar a.
Basilar a.
Precommunicating part of anterior cerebral a. (A1 segment)
Middle cerebral a. (M1 segment)
Posterior communicating a.
Posterior cerebral a.
Anterior inferior cerebellar a.

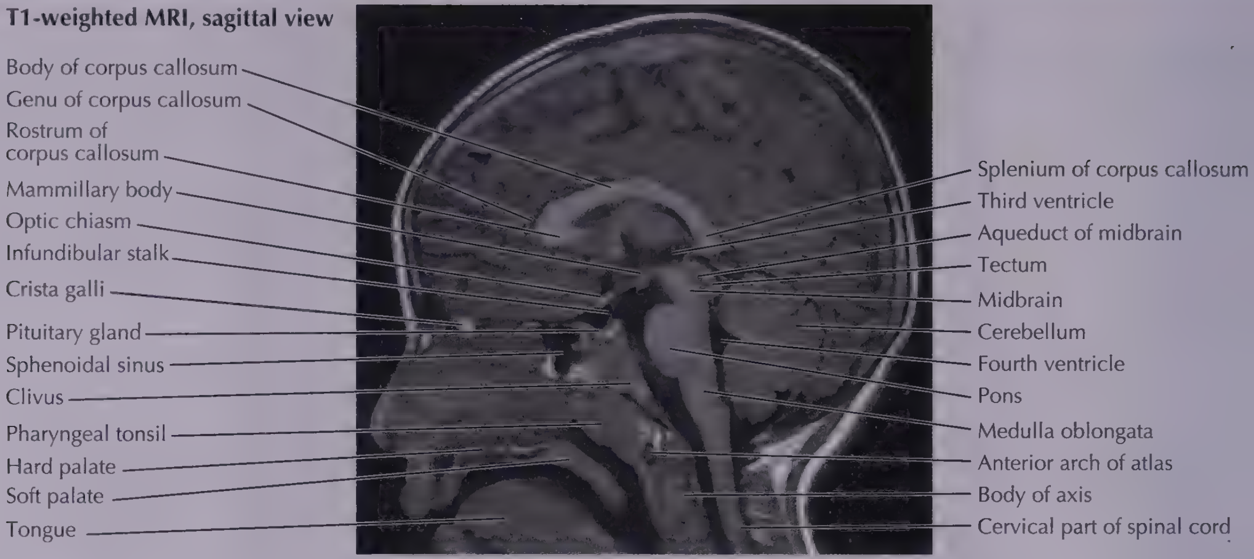
Magnetic resonance venography (MRV) (2D time-of-flight image without contrast)


Superior cerebral v.
Superior sagittal sinus
Internal cerebral v.
Great cerebral v. (of Galen)
Straight sinus
Confluence of sinuses
Transverse sinus
Sigmoid sinus
Internal jugular v.

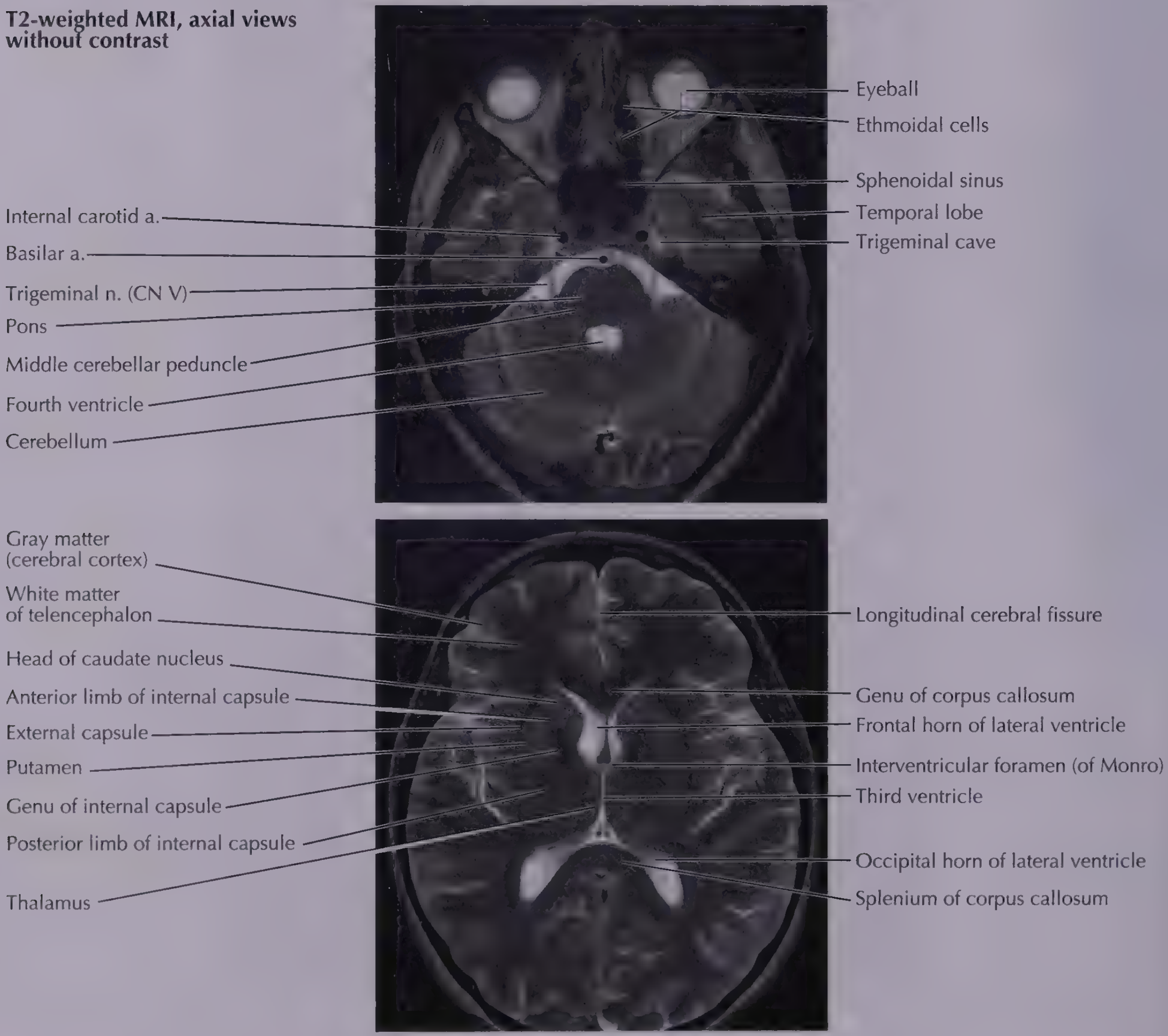
Cranial Imaging (MRI)

See also Plate BP 32

T1-weighted MRI, sagittal view


Body of corpus callosum
Genu of corpus callosum
Rostrum of corpus callosum
Mammillary body
Optic chiasm
Infundibular stalk
Crista galli
Pituitary gland
Sphenoidal sinus
Clivus
Pharyngeal tonsil
Hard palate
Soft palate
Tongue
Splenium of corpus callosum
Third ventricle
Aqueduct of midbrain
Tectum
Midbrain
Cerebellum
Fourth ventricle
Pons
Medulla oblongata
Anterior arch of atlas
Body of axis
Cervical part of spinal cord

T2-weighted MRI, axial views without contrast


Eyeball
Ethmoidal cells
Sphenoidal sinus
Temporal lobe
Trigeminal cave
Internal carotid a.
Basilar a.
Trigeminal n. (CN V)
Pons
Middle cerebellar peduncle
Fourth ventricle
Cerebellum
Gray matter (cerebral cortex)
White matter of telencephalon
Head of caudate nucleus
Anterior limb of internal capsule
External capsule
Putamen
Genu of internal capsule
Posterior limb of internal capsule
Thalamus
Longitudinal cerebral fissure
Genu of corpus callosum
Frontal horn of lateral ventricle
Interventricular foramen (of Monro)
Third ventricle
Occipital horn of lateral ventricle
Splenium of corpus callosum

ANATOMICAL STRUCTURE	CLINICAL COMMENT	PLATE NUMBERS
Nervous System and Sense Organs		
Spinal accessory nerve (CN XI)	Lymph node biopsy in posterior cervical triangle can cause iatrogenic injury of CN XI	56
Cervical plexus	Cervical plexus blocks are performed for neck procedures	56, 57
Trigeminal nerve (CN V)	Branches of CN V are anesthetized for procedures on face or anterior scalp; compression of the nerve may result in painful condition known as trigeminal neuralgia	60, 149
Olfactory nerve (CN I)	One of most commonly injured cranial nerves; can be avulsed at cribriform plate following falls, resulting in anosmia	64, 146
Facial nerve (CN VII)	Idiopathic unilateral facial nerve palsy (Bell's palsy) can result in inability to fully close eye and result in desiccated cornea ipsilaterally	71
Recurrent laryngeal nerve	May be compressed or damaged by procedures in neck (e.g., thyroidectomy), aortic arch aneurysm, or lung cancer, producing hoarseness of voice; identified by (posterior) suspensory ligament of thyroid and/or inferior thyroid artery and/or tracheoesophageal groove	104, 105
Oculomotor (CN III), trochlear (CN IV), and abducens (CN VI) nerves	Cavernous sinus thrombosis can result in dysfunction of extraocular muscles caused by compression of one, two, or all three nerves; abducens nerve is most commonly affected	131
Superior colliculus and aqueduct of midbrain	Tumor of midbrain can result in compression of aqueduct of midbrain, with resultant hydrocephalus	136
Optic nerve (CN II)	Pituitary gland mass may cause compression at optic chiasm and resulting bitemporal hemianopsia; optic radiations (Meyer's loop) can be affected by temporal lobe tumors; early sign of ophthalmic artery aneurysm is visual loss due to compression of overlying optic nerve.	147, 167
Fovea centralis	Location of highest density of retinal cones, making this part of macula lutea the site of greatest visual acuity and color vision	116
Utricle and saccule	Location of calcium carbonate crystals known as otoconia; accumulation of otoconia in semicircular canals is most common cause of vertigo and is known as benign paroxysmal positional vertigo (BPPV)	124, 125
Lens	Degeneration and opacification, known as cataract, may lead to progressive vision loss	116
Orbital septum	Infections anterior to this structure are known as preseptal/periorbital cellulitis and are milder than infections extending posterior to it, known as orbital cellulitis	110
Anterior segment of eyeball	Ciliary body produces aqueous humor, which flows through iris into anterior chamber and drains through scleral sinus; anterior displacement of lens may obstruct flow of aqueous humor and cause elevated intraocular pressure, a painful, vision-threatening condition known as acute angle closure glaucoma	117, 119
Tympanic membrane	Visualized with otoscope; bulging indicates middle ear infection with effusion; rupture and otorrhea may occur in severe infection; tympanostomy tubes (T-tubes) may be placed in children with recurrent effusive infections	122
External acoustic meatus	May become infected or inflamed in children, a condition known as otitis externa; can be diagnosed with auricle (pinna) pull technique	121
Skeletal System		
Orbit	Most facial trauma involves orbit; traumatic fractures can occur in rim or walls; a "blowout" fracture involves inferior wall and may injure inferior rectus muscle and/or infraorbital nerve; rim fractures affect contours of orbital rim and occur in zygomaticomaxillary fractures	25, 69

ANATOMICAL STRUCTURE	CLINICAL COMMENT	PLATE NUMBERS
Skeletal System—Continued		
Pterion	Intersection of frontal, parietal, temporal, and sphenoid bones; thin, weak region of skull that is susceptible to fracture; frontal branch of middle meningeal artery lies immediately deep to this region and may be injured	27
Asterion	Landmark at posterior end of parietotemporal suture, used in lateral neurosurgical approaches to posterior cranial fossa	27
Temporomandibular joint	Temporomandibular joint disorders are common sources of pain and joint dysfunction; poor replacement results to date; dislocations/subluxations can be reduced via retromolar fossa	42
Cranial sutures	Premature fusion may result in skull deformity known as craniosynostosis; sagittal suture is most often affected	26, 35
Cervical vertebrae	Degenerative changes causing narrowing of intervertebral foramina may result in cervical radiculopathy; C1–C4 and C5–C7 vertebrae are common areas of pathology for children and adults, respectively; neck hyperextension from abrupt deceleration may cause bilateral pedicle fractures in axis (C2 vertebra) known as hangman's fracture; hyperflexion may cause anterior wedge vertebral fracture; axial loads may cause burst fracture; dens axis (odontoid) fractures may occur with either forceful extension or flexion; all fractures are classified as "stable" or "unstable" depending on whether structural integrity of cervical spine has been sufficiently disrupted to permit compression of spinal cord	43–45
Laryngeal cartilages	Thyroid and cricoid cartilages are palpable landmarks of anterior neck used for cricothyrotomy, tracheostomy, and cricoid pressure during airway intubation	103, 106
Hyoid bone	Palpable anterior neck landmark at C3 vertebral level that can be fractured during sporting activities, compromising swallowing and speech; fractures may also indicate strangulation	54
Auditory ossicles	Pathologic conditions involving ossicles (e.g., otosclerosis) can cause conductive hearing loss	121, 122
Muscular System		
Muscles of facial expression	Used to assess function of facial nerve (CN VII) during cranial nerve examination; may become weak or paralyzed with CN VII dysfunction (e.g., Bell's palsy); often targeted with botulinum toxin injections for aesthetics (wrinkles), headache, and teeth grinding	48, 150
Sternocleidomastoid muscle	Important landmark that divides neck into anterior and posterior cervical triangles; palpated to identify "nerve point of neck" for administration of anesthesia to cervical plexus and also used as landmark for insertion of central venous catheters; in children, abnormal shortening or fibrosis of sternocleidomastoid muscle results in head tilt, a condition known as torticollis	56
Sternocleidomastoid and trapezius muscles	Used to assess function of spinal accessory nerve (CN XI) during cranial nerve examination	56, 154
Muscles of mastication	Used to assess function of trigeminal nerve (CN V) during cranial nerve examination; masseter is involved in teeth grinding and associated headaches, which can be treated with botulinum toxin injection	72, 73
Levator veli palatini and musculus uvulae	Used to assess function of vagus nerve (CN X) during cranial nerve examination; contralateral deviation of uvula of soft palate during elevation indicates CN X dysfunction	85
Genioglossus muscle	Used to assess hypoglossal nerve (CN XII) function during cranial nerve examination; tongue deviates to side of lesion when protruded following CN XII injury	88, 155
Styloglossus muscle	Posterosuperior movement covers laryngeal inlet, protecting vocal cords and airway, which is especially crucial if epiglottis has been surgically removed because of malignancy	88, 95, 96

ANATOMICAL STRUCTURE	CLINICAL COMMENT	PLATE NUMBERS
Stapedius muscle	Smallest skeletal muscle in the body, regulates movement of stapes bone to control amplitude of sound	123
Levator palpebrae superioris and superior tarsal muscle	Responsible for elevating eyelid; ptosis indicates pathologic change in oculomotor nerve (CN III) or sympathetic fibers (if only superior tarsal muscle is affected)	110, 112
Extraocular muscles	Used to assess function of oculomotor (CN III), trochlear (CN IV), and abducens (CN VI) nerves during cranial nerve examination; abnormalities in tone result in disconjugate eye movements, a condition known as strabismus	112, 114
Dilator pupillae	Important in assessment of sympathetic function in head; lack of dilation indicates interruption in sympathetic outflow (e.g., Horner's syndrome)	117, 148
Sphincter pupillae	Involved in pupillary light reflex and accommodation reflex	117, 148
Pterygomandibular raphe	Valuable intraoral landmark for inferior alveolar nerve blocks to anesthetize mandibular teeth	96, 97–99
Modiolus of angulus oris	A fibrous intersection of facial muscles, approximately 1 cm lateral to corner of mouth; valuable landmark when considering reconstruction of injured facial muscles associated with oral region	48
Retromolar fossa	Important clinical landmark for reducing dislocated temporomandibular joints; buccal and lingual nerves pass by the retromolar fossa and may be harmed in dental molar implant surgery	39
Cardiovascular System		
Right internal and external jugular veins	Examined to assess right atrial pressure, estimated as height of jugular pulsation above sternal angle (in centimeters) plus 5; right internal jugular vein is preferred because it is in line with superior vena cava	50
Internal jugular vein	Thrombosis may occur secondary to local extension of inflammation from severe pharyngitis, a condition known as Lemierre's syndrome	50
Internal jugular and subclavian veins	Used to obtain venous access via insertion of central venous catheter	50, 100
Inferior thyroid artery	At risk during thyroidectomy; must be preserved to maintain blood supply to parathyroid glands; identified by its redundant loop shape and is landmark to identify recurrent laryngeal nerve	57, 104
Common carotid artery	Palpate in neck to assess carotid pulse; bifurcation typically at C4 vertebral level	58, 165
Internal carotid artery	Common site for atherosclerosis, which may be treated with stent or endarterectomy for stroke prevention; carotid sinus is sensitive to changes in circulating blood volume and may be massaged to induce vagal reaction; internal carotid artery has no branches in neck; classified into seven parts: C1, cervical; C2, petrous; C3, lacerum; C4, cavernous; C5, clinoid; C6, ophthalmic; and C7, communicating	163, 164
Anterior ethmoidal, sphenopalatine, and facial arteries	Anastomosis site of branches of these vessels in nasal vestibule, known as Kiesselbach's plexus or Little's area, is common site of anterior nosebleeds (epistaxis); sphenopalatine artery injury causes posterior nosebleeds	65
Pterygoid venous plexus	Common route for spread of infection due to connections between face, orbit, and venous sinuses; valveless veins allow retrograde flow	100, 115
Ophthalmic artery	Primary source of blood to retina; blindness may occur if artery is occluded	115, 119
Arteries of scalp	Scalp lacerations bleed profusely owing to rich blood supply	24, 127
Superior cerebral veins	May be torn from their junction with superior sagittal sinus, producing subdural hematoma	129, 130, 136
Middle meningeal artery	Trauma to pterion can tear middle meningeal artery (frontal branch), often causing epidural hematoma	128

ANATOMICAL STRUCTURE	CLINICAL COMMENT	PLATE NUMBERS
Cardiovascular System—Continued		
Dural venous sinuses	Infections in head may spread to sinuses, causing dural venous sinus thrombosis; cavernous sinus is most common site	130, 131
Cavernous sinus	Fistula (anastomosis) between internal carotid artery and cavernous sinus may form, especially following trauma	131,167
Carotid sinus	Compressed during carotid sinus massage, which may result in bradycardia and/or hypertension; carotid sinus hypersensitivity, most common among older adults, may cause syncope	157
Cerebral arterial circle of Willis	Common site of aneurysms and important site of collateral cerebral circulation; aneurysmal rupture produces subarachnoid hemorrhage	166
Emissary veins	Valveless veins, which can convey infection extracranially to intracranially and allow alternative route for drainage when dural venous sinuses are obstructed	129
Lymph Vessels and Lymphoid Organs		
Thoracic duct	Thoracic duct may be injured during surgeries to neck and thorax due to multiple and frequent variants; injury in lower neck region is often at junction of left internal jugular and subclavian veins; increased risk during esophageal surgery and left central venous line placement	101, 260
Superior and inferior deep lateral cervical nodes	Palpated during neck examination to assess size and shape; if coalescent, malignancy must be excluded	101, 102
Palatine and pharyngeal tonsils	Palatine tonsils are commonly involved with viral and bacterial infection; exudative lesions combined with fever, lymphadenopathy, and lack of cough suggestive of streptococcal infection (strep throat); enlarged pharyngeal tonsils (adenoids) cause snoring and can cover auditory (eustachian) tube opening, increasing risk of middle ear infections	90
Respiratory System		
Epiglottis	Crucial landmark during endotracheal intubation; bacterial or viral infection (e.g., with *Haemophilus influenzae*) may cause epiglottitis, which presents with respiratory distress, sore throat, and hoarse voice	93–95
Paranasal sinuses (maxillary, ethmoid, frontal, and sphenoid)	Cavities in skull prone to mucosal inflammation due to bacterial or viral infection	67, 69
Nasal septum	Congenital or acquired deviation may lead to nasal obstruction, treated with septoplasty; perforations may occur with cocaine use or in granulomatosis with polyangiitis	37, 69
Digestive System		
Parotid gland	Swelling of gland due to infection (parotitis), such as from viruses or bacteria, may cause pain and compress branches of facial nerve, producing facial muscle weakness; external carotid, superficial temporal, and maxillary arteries also pass through the gland	70, 71
Endocrine System		
Thyroid gland	Enlargement is known as goiter; may be partially or completely removed in malignancy or hyperthyroidism; during examination should move relatively equally bilaterally with hyoid bone and laryngeal cartilages; malignancy may anchor portion of gland and cause asymmetrical movement	103

*Selections were based largely on clinical data and commonly discussed clinical correlations in macroscopic ("gross") anatomy courses.

Cranial nerves are traditionally described as tree-like structures that emerge from the brain and branch peripherally. This matches the direction that action potentials travel in efferent fibers in nerves. It must be remembered that action potentials travel in the opposite direction in afferent fibers within these nerves.

NERVE	ORIGIN	COURSE	BRANCHES	MOTOR	SENSORY
Olfactory nerve (CN I)	Olfactory bulb	Neurons of olfactory mucosa send approximately 20 axon bundles through cribriform plate to synapse on olfactory bulb neurons			SVA (smell): olfactory epithelium
Optic nerve (CN II)	Optic chiasm	Axons of retinal ganglion neurons exit orbit through optic canal to enter cranial cavity			SSA (vision): optic part of retina
Oculomotor nerve (CN III)	Interpeduncular fossa of midbrain	Exits midbrain into posterior cranial fossa and then middle cranial fossa; traverses cavernous sinus to enter orbit via superior orbital fissure	Superior and inferior branches	GSE: medial, superior, and inferior rectus muscles, inferior oblique muscle, and levator palpebrae superioris GVE: ciliary ganglion	
Trochlear nerve (CN IV)	Posterior surface of midbrain	Exits dorsal midbrain, coursing lateral to cerebral peduncle to anterior surface of brain stem; follows medial edge of tentorium cerebelli to enter middle cranial fossa; traverses cavernous sinus to enter orbit via superior orbital fissure		GSE: superior oblique muscle	
Trigeminal nerve (CN V)	Motor and sensory roots (arising from pons)	Exits anterolateral pons into posterior cranial fossa; large sensory and small motor roots enter middle cranial fossa; sensory root forms trigeminal ganglion, which gives rise to ophthalmic, maxillary, and mandibular nerves; motor root passes deep to ganglion and contributes only to mandibular nerve	Ophthalmic, maxillary, and mandibular nerves	SVE: see branches	GSA: see branches
Ophthalmic nerve (CN V_1)	Trigeminal nerve	Exits anterior border of trigeminal ganglion and traverses cavernous sinus to leave cranium through superior orbital fissure into orbit	Lacrimal, frontal, and nasociliary nerves, meningeal branch		GSA: forehead, upper eyelid, conjunctiva
Maxillary nerve (CN V_2)	Trigeminal nerve	Exits trigeminal ganglion, passes through foramen rotundum into pterygopalatine fossa, and enters orbit via inferior orbital fissure	Nasopalatine, pharyngeal, palatine, zygomatic, posterior superior alveolar, and infraorbital nerves, superior posterior nasal and meningeal branches		GSA: midface, nasal cavity, paranasal sinuses, palate, maxillary teeth
Mandibular nerve (CN V_3)	Trigeminal nerve	Exits trigeminal ganglion inferiorly, leaves cranium through foramen ovale and enters infratemporal fossa	Deep temporal, buccal, auriculotemporal, lingual, and inferior alveolar nerves, meningeal branch	SVE: muscles of mastication, mylohyoid and digastric (anterior belly) muscles, tensor tympani, tensor veli palatini	GSA: mandibular teeth, anterior tongue, floor of oral cavity, temporomandibular joint

Continued

NERVE	ORIGIN	COURSE	BRANCHES	MOTOR	SENSORY
Abducens nerve (CN VI)	Medullopontine sulcus (medial to CN VII)	Exits between pons and medulla near midline, pierces dura on clivus and grooves on petrous part of temporal bone to access middle cranial fossa; traverses cavernous sinus to enter orbit through superior orbital fissure		GSE: lateral rectus muscle	
Facial nerve (CN VII)	Motor root and intermediate nerve (sensory root)	Exits laterally between pons and medulla oblongata as a larger motor root and smaller intermediate nerve (carrying SVA, GVE, and GSA fibers); both roots traverse internal acoustic meatus to enter facial canal, in which a sharp turn (genu) occurs just before geniculate (facial) ganglion; facial nerve gives off several branches within facial canal, before it exits through stylomastoid foramen and forms terminal branches within parotid gland	Greater petrosal and posterior auricular nerves, chorda tympani, and temporal, zygomatic, buccal, marginal mandibular, and cervical branches	SVE: muscles of facial expression (including epicranial muscles and platysma), digastric (posterior belly), stylohyoid, and stapedius muscles GVE: pterygopalatine and submandibular ganglia	SVA (taste): anterior tongue and palate GSA: part of external ear
Vestibulocochlear nerve (CN VIII)	Medullopontine sulcus (lateral to CN VII)	Exits brain stem between pons and medulla oblongata, near inferior cerebellar peduncle, and divides into two branches as it traverses posterior cranial fossa	Vestibular and cochlear nerves		SSA: internal ear (see branches)
Cochlear nerve	Vestibulocochlear nerve	Contains processes of cochlear ganglion cells; passes through internal acoustic meatus into internal ear			SSA (hearing): spiral organ of cochlear duct
Vestibular nerve	Vestibulocochlear nerve	Contains processes of vestibular ganglion cells; passes through internal acoustic meatus into internal ear	Superior and inferior branches		SSA (equilibrium and motion): maculae and cristae ampullares of vestibular labyrinth
Glossopharyngeal nerve (CN IX)	Retro-olivary groove of medulla oblongata	Emerges from upper medulla between olive and inferior cerebral peduncle and exits cranium by traversing jugular foramen with vagus and accessory nerves; superior and inferior ganglia for afferent components of CN IX are located just inferior to jugular foramen; passes inferiorly, innervating and following stylopharyngeus muscle, ultimately sending a branch into posterior oral cavity that passes deep to hyoglossus muscle and a branch that enters pharynx by passing between superior and middle pharyngeal constrictors	Tympanic nerve	SVE: stylopharyngeus muscle GVE: otic ganglion	SVA (taste): posterior tongue GVA: carotid body and sinus GSA: posterior tongue, oropharynx, middle ear

NERVE	ORIGIN	COURSE	BRANCHES	MOTOR	SENSORY
Vagus nerve (CN X)	Retro-olivary groove of medulla oblongata (between CN IX and cranial roots of CN XI)	Exits from retro-olivary groove of medulla oblongata to traverse jugular foramen with accessory and glossopharyngeal nerves; initially runs between internal carotid artery and internal jugular vein; courses of right and left vagus nerves differ, with right vagus nerve coursing inferiorly between subclavian artery and vein, at which point right recurrent laryngeal nerve ascends and vagus nerve descends along trachea and root of right lung, forming pulmonary and esophageal plexuses; left vagus nerve descends between left subclavian and common carotid arteries posteriorly to left brachiocephalic vein, and anteriorly to aortic arch, at which point left recurrent laryngeal nerve ascends posteriorly to aorta and rest of vagus nerve descends posteriorly to root of lung, forming pulmonary and esophageal plexuses; vagus nerve fibers continue into abdomen via esophageal plexuses and vagal trunks	Pharyngeal branch, superior and recurrent laryngeal nerves	GVE: thoracic and abdominal visceral ganglia SVE: see branches	GVA: aortic arch and bodies SVA (taste): epiglottis, oropharynx GSA: external ear (also see branches)
Pharyngeal branch of vagus nerve	Vagus nerve	Passes between carotid arteries superficial to middle pharyngeal constrictor		SVE: pharyngeal constrictors; palatoglossus, palatopharyngeus, and salpingopharyngeus muscles; and levator veli palatini	
Superior laryngeal nerve	Vagus nerve	Exits inferior ganglion, passing inferiorly and medially deep to internal carotid artery, dividing into external (motor) branch and internal (sensory) branch that pierces thyrohyoid membrane	Internal and external branches	SVE: cricothyroid muscle	GSA: superior larynx
Recurrent laryngeal nerve	Vagus nerve	On right side, arises anterior to subclavian artery and spirals to run superiorly and posteriorly to common carotid and inferior thyroid arteries, lateral to trachea; on left side, arises inferior to aortic arch, passing posterior to arch and lateral to ligamentum arteriosum to ascend superiorly lateral to trachea; both right and left nerves enter larynx at junction of esophagus and inferior pharyngeal constrictor		SVE: intrinsic muscles of larynx (except cricothyroid), striated muscle of esophagus	GSA: inferior larynx

Continued

NERVE	ORIGIN	COURSE	BRANCHES	MOTOR	SENSORY
Accessory nerve (CN XI)	Cranial and spinal roots	Spinal roots from C1–C5 segments of spinal cord ascend and enter cranium through foramen magnum, where they course with cranial root arising from retroolivary groove of medulla oblongata; spinal accessory nerve exits from cranium via jugular foramen; it passes inferiorly and posteriorly into upper third of sternocleidomastoid muscle and then inferiorly, crossing occipital triangle to enter trapezius muscle; vagal communicating branch joins vagus nerve at jugular foramen to innervate larynx, palate, and pharyngeal muscles	Spinal accessory nerve, vagal communicating branch	GSE: trapezius and sternocleidomastoid muscles	
Hypoglossal nerve (CN XII)	Hypoglossal rootlets and hypoglossal communicating branch of C1 spinal nerve	Rootlets from anterolateral sulcus of medulla oblongata exit cranium through hypoglossal canal, then pass inferiorly and anteriorly between vagus and spinal accessory nerves to inferior border of posterior belly of digastric muscle, eventually entering oral cavity by passing between mylohyoid and hyoglossus muscles	Lingual branches and branches conveying fibers from C1 spinal nerve (thyrohoid and geniohyoid branches and superior root of ansa cervicalis)	GSE: intrinsic muscles of tongue and genioglossus, hyoglossus, and styloglossus muscles C1: thyrohyoid, geniohyoid, and omohyoid (superior belly) muscles	

The roots of the cervical plexus are the anterior rami of C1–C4 spinal nerves.

NERVE	ORIGIN	COURSE	BRANCHES	MOTOR	CUTANEOUS SENSORY
Hypoglossal communicating branch	Anterior ramus of C1 spinal nerve	Emerges and briefly adheres to hypoglossal nerve; superior root of ansa cervicalis exits just posterior to greater horn of hyoid bone and descends along carotid sheath, where it joins inferior root at C4–C5 level	Superior root of ansa cervicalis, thyrohyoid and geniohyoid branches of hypoglossal nerve	Omohyoid (superior belly), thyrohyoid, and geniohyoid muscles	
Inferior root of ansa cervicalis	Anterior rami of C2–C3 spinal nerves	Descends along anterolateral carotid sheath, joining superior root at C4–C5 level	Infrahyoid branches	Omohyoid (inferior belly), sternohyoid, and sternothyroid muscles	
Muscular branches of cervical plexus	Anterior rami of C1–C4 spinal nerves	Three loops form along C1–C4 vertebrae that course laterally between levator scapulae and scalenus medius muscle, deep to sternocleidomastoid muscle		Rectus anterior and lateralis capitis muscles; longus capitis and colli muscles; scalenus anterior, medius and posterior muscles; levator scapulae	
Phrenic nerve	Anterior rami of C3-C5 spinal nerves	Descends on scalenus anterior muscle deep to inferior belly of omohyoid muscle and transverses cervical and suprascapular vessels; enters thorax between subclavian vein and artery, passing anterior to root of lung and along lateral border of pericardium to pierce diaphragm		Diaphragm	
Lesser occipital nerve	Anterior ramus of C2 spinal nerve	Formed in posterior cervical triangle deep to sternocleidomastoid muscle, ascending along its posterior border; perforates deep fascia at mastoid process, ascending posterior to ear			Temporal, auricular, and mastoid regions
Great auricular nerve	Anterior rami of C2–C3 spinal nerves	Formed in posterior cervical triangle deep to sternocleidomastoid muscle, ascending obliquely between that muscle and platysma	Anterior and posterior branches		Parotid, auricular, and mastoid regions
Transverse cervical nerve	Anterior rami of C2–C3 spinal nerves	Formed in posterior cervical triangle deep to sternocleidomastoid muscle, runs superficial to that muscle, passing deep to external jugular vein	Superior and inferior branches		Anterior and lateral regions of neck
Supraclavicular nerve	Anterior rami of C3–C4 spinal nerves	Formed in posterior cervical triangle deep to mid-third of sternocleidomastoid muscle, passes lateral to external jugular vein, and descends just inferior to clavicle	Medial, intermediate, and lateral supraclavicular nerves		Clavicular and infraclavicular regions

MUSCLE	MUSCLE GROUP	ORIGIN ATTACHMENT	INSERTION ATTACHMENT	INNERVATION	BLOOD SUPPLY	MAIN ACTIONS
Auricularis anterior m.	Facial expression (external ear)	Temporal fascia, epicranial aponeurosis	Anterior part of medial surface of helix of ear	Temporal branches of facial nerve	Posterior auricular and superficial temporal arteries	Elevates and draws auricle forward
Auricularis posterior m.	Facial expression (external ear)	Mastoid process	Inferior part of medial surface of auricle	Posterior auricular nerve (branch of facial nerve)	Posterior auricular and superficial temporal arteries	Retracts and elevates auricle
Auricularis superior m.	Facial expression (external ear)	Temporal fascia, epicranial aponeurosis	Superior part of medial surface of auricle	Temporal branches of facial nerve	Posterior auricular and superficial temporal arteries	Retracts and elevates auricle
Bucinator	Facial expression	Posterior portions of alveolar processes of maxilla and mandible, anterior border of pterygomandibular raphe	Modiolus of angle of mouth	Buccal branches of facial nerve	Facial and maxillary arteries	Compresses cheeks
Ciliary m.	Intrinsic eye (smooth muscle)	Scleral spur	Choroid	Short ciliary nerves (parasympathetic fibers from ciliary ganglion)	Ophthalmic artery	Constricts ciliary body and lens rounds up (accommodation)
Corrugator supercilii	Facial expression	Medial part of supra-orbital margin	Skin of medial half of eyebrow	Temporal branches of facial nerve	Superficial temporal artery	Draws eyebrows inferiorly and medially, produces vertical wrinkles of skin between eyebrows
Cricothyroid m.	Laryngeal	Arch of cricoid cartilage	Inferior border of lamina and inferior horn of thyroid cartilage	External branch of superior laryngeal nerve	Superior and inferior thyroid arteries	Lengthens and tenses vocal ligaments
Depressor anguli oris	Facial expression	Oblique line of mandible	Modiolus of angle of mouth	Marginal mandibular and buccal branches of facial nerve	Inferior labial artery	Depresses angle of mouth
Depressor labii inferioris	Facial expression	External surface of mandible between symphysis and mental foramen	Skin of lower lip	Marginal mandibular branches of facial nerve	Inferior labial artery	Depresses lower lip and draws it laterally
Depressor septi nasi	Facial expression	Incisive fossa of maxilla	Nasal septum and posterior part of ala of nose	Zygomatic and buccal branches of facial nerve	Superior labial artery	Narrows nostril, draws septum inferiorly
Digastric m.	Suprahyoid	*Anterior belly:* digastric fossa of mandible *Posterior belly:* mastoid notch of temporal bone	Intermediate tendon attached to body of hyoid	*Anterior belly:* inferior alveolar nerve (branch of mandibular nerve) *Posterior belly:* digastric branch of facial nerve	*Anterior belly:* submental artery *Posterior belly:* posterior auricular and occipital arteries	Elevates hyoid bone and base of tongue, steadies hyoid bone, opens mouth by depressing mandible
Dilator pupillae	Intrinsic eye (smooth muscle)	Iridal part of retina	Pupillary margin of iris	Long ciliary nerves (sympathetic fibers from superior cervical ganglion)	Ophthalmic artery	Dilates pupil
Frontalis m.	Facial expression (epicranial)	Epicranial aponeurosis (at level of coronal suture)	Skin of frontal region, epicranial aponeurosis	Temporal branches of facial nerve	Superficial temporal artery	Horizontally wrinkles skin of forehead, elevates eyebrows
Genioglossus m.	Extrinsic tongue	Superior mental spine of mandible	Dorsum of tongue, hyoid bone	Hypoglossal nerve (CN XII)	Sublingual and submental arteries	Depresses and protrudes tongue
Geniohyoid m.	Suprahyoid	Inferior mental spine of mandible	Anterior surface of body of hyoid bone	Anterior ramus of C1 spinal nerve (via hypoglossal nerve)	Sublingual artery	Elevates hyoid bone and depresses mandible
Hyoglossus m.	Extrinsic tongue	Body and greater horn of hyoid bone	Margin and inferior surface of tongue	Hypoglossal nerve (CN XII)	Sublingual and submental arteries	Depresses and retracts tongue
Inferior longitudinal lingual m.	Intrinsic tongue	Inferior surface of tongue	Apex of tongue	Hypoglossal nerve (CN XII)	Lingual and facial arteries	Shortens tongue, turns tip and sides inferiorly

MUSCLE	MUSCLE GROUP	ORIGIN ATTACHMENT	INSERTION ATTACHMENT	INNERVATION	BLOOD SUPPLY	MAIN ACTIONS
Inferior oblique m.	Extraocular	Anterior floor of orbit (lateral to nasolacrimal canal)	Sclera lateral to corneoscleral junction	Oculomotor nerve (CN III)	Ophthalmic artery	Abducts, elevates, and laterally rotates eyeball
Inferior pharyngeal constrictor	Circular pharyngeal	Oblique line of thyroid cartilage, cricoid cartilage	Pharyngeal raphe	Vagus nerve (via pharyngeal plexus)	Ascending pharyngeal and superior thyroid arteries	Constricts wall of pharynx during swallowing
Inferior rectus m.	Extraocular	Common tendinous ring	Sclera inferior to corneoscleral junction	Oculomotor nerve (CN III)	Ophthalmic artery	Depresses, adducts, and laterally rotates eyeball
Lateral cricoarytenoid m.	Laryngeal	Arch of cricoid cartilage	Muscular process of arytenoid cartilage	Recurrent laryngeal nerve	Superior and inferior thyroid arteries	Adducts vocal folds
Lateral pterygoid m.	Mastication	*Superior head:* infratemporal surface of greater wing of sphenoid bone	Pterygoid fovea of mandible, capsule and articular disc of temporomandibular joint	Mandibular nerve (CN V_3)	Maxillary artery	*Bilaterally:* protrudes mandible
		Inferior head: lateral pterygoid plate				*Unilaterally and alternately:* produces side-to-side grinding
Lateral rectus m.	Extraocular	Common tendinous ring	Sclera lateral to corneoscleral junction	Abducens nerve (CN VI)	Ophthalmic artery	Abducts eyeball
Levator anguli oris	Facial expression	Canine fossa of maxilla	Modiolus of angle of mouth	Zygomatic and buccal branches of facial nerve	Superior labial artery	Elevates angle of mouth
Levator labii superioris	Facial expression	Maxilla superior to infraorbital foramen	Skin of upper lip	Zygomatic and buccal branches of facial nerve	Superior labial and angular arteries	Elevates upper lip, dilates nares
Levator nasolabialis (levator labii superioris alaeque nasi)	Facial expression	Superior part of frontal process of maxilla	Major alar cartilage, skin of nose, lateral part of upper lip	Zygomatic and buccal branches of facial nerve	Superior labial and angular arteries	Elevates upper lip and dilates nostril
Levator palpebrae superioris	Extraocular	Lesser wing of sphenoid bone (anterior to optic canal)	Superior tarsus	Oculomotor nerve (CN III)	Ophthalmic artery	Elevates upper eyelid
Levator veli palatini	Palatal	Petrous part of temporal bone, auditory tube	Palatine aponeurosis	Vagus nerve (via pharyngeal plexus)	Ascending and descending palatine arteries	Elevates soft palate during swallowing
Longus capitis m.	Anterior vertebral	Anterior tubercles of transverse processes of C3–C6 vertebrae	Inferior surface of basilar part of occipital bone	Anterior rami of C1–C3 spinal nerves	Ascending cervical, ascending pharyngeal and vertebral arteries	Flexes head
Longus colli m.	Anterior vertebral	*Vertical portion:* C5–T3 vertebrae	*Vertical portion:* C2–C4 vertebrae	Anterior rami of C2–C8 spinal nerves	Ascending pharyngeal, ascending cervical and vertebral arteries	*Bilaterally:* flex and assist in rotating cervical vertebrae and head
		Inferior oblique portion: T1–T3 vertebrae	*Inferior oblique portion:* anterior tubercles of transverse processes of C3–C6 vertebrae			*Unilaterally:* laterally flexes vertebral column
		Superior oblique portion: anterior tubercles of transverse processes of C3–C5 vertebrae	*Superior oblique portion:* anterior tubercle of atlas			
Masseter	Mastication	Zygomatic arch	Ramus of mandible, coronoid process	Mandibular nerve (CN V_3)	Transverse facial, masseteric, and facial arteries	Elevates and protrudes mandible; deep fibers retract it

Continued

MUSCLE	MUSCLE GROUP	ORIGIN ATTACHMENT	INSERTION ATTACHMENT	INNERVATION	BLOOD SUPPLY	MAIN ACTIONS
Medial pterygoid m.	Mastication	Medial surface of lateral pterygoid plate, pyramidal process of palatine bone, maxillary tuberosity	Medial surface of ramus and angle of mandible (inferior to inferior alveolar foramen)	Mandibular nerve (V_3)	Facial and maxillary arteries	Bilaterally: protrudes and elevates mandible Unilaterally and alternately: produces side-to-side movements
Medial rectus m.	Extraocular	Common tendinous ring	Sclera medial to corneoscleral junction	Oculomotor nerve (CN III)	Ophthalmic artery	Adducts eyeball
Mentalis m.	Facial expression	Incisive fossa of mandible	Skin of chin	Marginal mandibular branch of facial nerve	Inferior labial artery	Elevates and protrudes lower lip
Middle pharyngeal constrictor	Circular pharyngeal	Stylohyoid ligament, horns of hyoid bone	Pharyngeal raphe	Vagus nerve (via pharyngeal plexus)	Ascending pharyngeal and ascending palatine arteries, tonsillar branches of facial artery, dorsal lingual branches of lingual artery	Constricts wall of pharynx during swallowing
Musculus uvulae	Palatal	Posterior nasal spine (of palatine bone), palatine aponeurosis	Mucosa of uvula of palate	Vagus nerve (via pharyngeal plexus)	Ascending and descending palatine arteries	Shortens, elevates, and retracts uvula of the palate
Mylohyoid m.	Suprahyoid	Mylohyoid line of mandible	Median raphe of mylohyoid, body of hyoid bone	Inferior alveolar nerve (branch of mandibular nerve)	Sublingual and submental arteries	Elevates hyoid bone, base of tongue, floor of mouth; depresses mandible
Nasalis m.	Facial expression	Canine eminence (superior and lateral to incisive fossa of maxilla)	Aponeurosis on nasal cartilages	Buccal branches of facial nerve	Superior labial artery, septal and lateral nasal branches of facial artery	Draws ala of nose toward nasal septum, compresses nostrils; alar part opens nostrils
Oblique arytenoid m.	Laryngeal	Arytenoid cartilage	Opposite arytenoid cartilage	Recurrent laryngeal nerve	Superior and inferior thyroid arteries	Closes intercartilaginous portion of rima glottidis
Occipitalis m.	Facial expression (epicranial)	Lateral two-thirds of superior nuchal line, mastoid process	Skin of occipital region, epicranial aponeurosis	Posterior auricular nerve (branch of facial nerve)	Posterior auricular and occipital arteries	Moves scalp backward
Omohyoid m.	Infrahyoid	*Inferior belly:* superior border of scapula, superior transverse scapular ligament	Intermediate tendon of omohyoid	*Inferior belly:* ansa cervicalis (C2–C3)	Lingual and superior thyroid arteries	Steadies and depresses hyoid bone
		Superior belly: body of hyoid bone		*Superior belly:* ansa cervicalis (C1)		
Orbicularis oculi m.	Facial expression	Medial orbital margin, medial palpebral ligament, lacrimal bone	Skin around orbit, lateral palpebral ligament, upper and lower eyelids	Temporal and zygomatic branches of facial nerve	Facial and superficial temporal arteries	Closes eyelids
Orbicularis oris m.	Facial expression	Maxilla and mandible, perioral skin and muscles	Modiolus of angle of mouth	Buccal and marginal mandibular branches of facial nerve	Inferior and superior labial arteries	Compression, contraction, and protrusion of lips
Palatoglossus m.	Palatal	Palatine aponeurosis	Margin of tongue	Vagus nerve (via pharyngeal plexus)	Ascending pharyngeal artery, palatine branches of facial and maxillary arteries	Elevates posterior tongue, depresses palate
Palatopharyngeus m.	Palatal	Hard palate, palatine aponeurosis	Lateral pharyngeal wall	Vagus nerve (via pharyngeal plexus)	Ascending and descending palatine arteries	Tenses soft palate; pulls walls of pharynx superiorly, anteriorly, and medially during swallowing

MUSCLE	MUSCLE GROUP	ORIGIN ATTACHMENT	INSERTION ATTACHMENT	INNERVATION	BLOOD SUPPLY	MAIN ACTIONS
Platysma	Facial expression (neck)	Skin of infraclavicular region	Mandible, muscles of lower lip	Cervical branch of facial nerve	Submental and suprascapular arteries	Tenses skin of neck
Posterior cricoarytenoid m.	Laryngeal	Posterior surface of lamina of cricoid cartilage	Muscular process of arytenoid cartilage	Recurrent laryngeal nerve	Superior and inferior thyroid arteries	Abducts vocal folds
Procerus m.	Facial expression	Fascia covering inferior part of nasal bone and superior part of lateral nasal cartilage	Skin medial and superior to eyebrow	Temporal and zygomatic branches of facial nerve	Angular artery, lateral nasal branches of facial artery	Draws down medial angle of eyebrows, produces transverse wrinkles over bridge of nose
Rectus anterior capitis m.	Anterior vertebral	Lateral mass of atlas	Basilar part of occipital bone	Anterior rami of C1–C2 spinal nerves	Vertebral and ascending pharyngeal arteries	Flexes head
Rectus lateralis capitis m.	Anterior vertebral	Superior surface of transverse process of atlas	Inferior surface of jugular process of occipital bone	Anterior rami of C1–C2 spinal nerves	Vertebral, occipital, and ascending pharyngeal arteries	Flexes head laterally to same side
Risorius m.	Facial expression	Fascia over masseter	Modiolus of angle of mouth	Buccal branches of facial nerve	Superior labial artery	Retracts angle of mouth
Salpingopharyngeus m.	Longitudinal pharyngeal	Auditory tube	Lateral pharyngeal wall	Vagus nerve (via pharyngeal plexus)	Ascending pharyngeal artery	Elevates pharynx and larynx during swallowing and speaking
Scalenus anterior m.	Lateral vertebral	Anterior tubercles of transverse processes of C3–C6 vertebrae	Scalene tubercle on 1st rib	Anterior rami of C5–C8 spinal nerves	Ascending cervical artery	Elevates 1st rib, bends neck
Scalenus medius m.	Lateral vertebral	Posterior tubercles of transverse processes of C2–C7 vertebrae	Superior surface of 1st rib (behind subclavian groove)	Anterior rami of C3–C7 spinal nerves	Ascending cervical artery	Elevates 1st rib, bends neck
Scalenus posterior m.	Lateral vertebral	Posterior tubercles of transverse processes of C4–C6 vertebrae	External surface of 2nd rib	Anterior rami of C5–C8 spinal nerves	Ascending cervical artery, superficial branch of transverse cervical artery	Elevates 2nd rib, bends neck
Sphincter pupillae	Intrinsic eye (smooth muscle)	Circular smooth muscle of iris that passes around pupil	Blends with dilator pupillae fibers	Short ciliary nerves (parasympathetic fibers from ciliary ganglion)	Ophthalmic artery	Constricts pupil
Stapedius m.	Middle ear	Pyramidal eminence of temporal bone (in tympanic cavity)	Stapes	Nerve to stapedius muscle (branch of facial nerve)	Posterior auricular, anterior tympanic, and middle meningeal arteries	Pulls stapes posteriorly to lessen oscillation of tympanic membrane
Sternocleidomastoid m.	Neck	*Sternal head:* anterior surface of manubrium sterni	Lateral surface of mastoid process; lateral half of superior nuchal line of occipital bone	Spinal accessory nerve (CN XI)	Superior thyroid, occipital, suprascapular, and posterior auricular arteries	*Bilaterally:* flexes head, elevates thorax
		Clavicular head: medial third of superior surface of clavicle				*Unilaterally:* turns face toward opposite side
Sternohyoid m.	Infrahyoid	Posterior surface of manubrium sterni, posterior sternoclavicular ligament, sternal end of clavicle	Medial part of inferior border of body of hyoid bone	Ansa cervicalis (C1–C3)	Superior thyroid and lingual arteries	Depresses larynx and hyoid bone, steadies hyoid bone
Sternothyroid m.	Infrahyoid	Posterior surface of manubrium sterni, posterior border of 1st costal cartilage	Oblique line of thyroid cartilage	Ansa cervicalis (C1–C3)	Cricothyroid branch of superior thyroid artery	Depresses larynx and thyroid cartilage
Styloglossus m.	Extrinsic tongue	Styloid process of temporal bone, stylohyoid ligament	Margin and inferior surface of tongue	Hypoglossal nerve (CN XII)	Sublingual artery	Retracts tongue and draws it up for swallowing
Stylohyoid m.	Suprahyoid	Posterior border of styloid process of temporal bone	Body of hyoid bone (at junction with greater horn)	Stylohyoid branch of facial nerve	Facial and occipital arteries	Elevates and retracts hyoid bone

Continued

MUSCLE	MUSCLE GROUP	ORIGIN ATTACHMENT	INSERTION ATTACHMENT	INNERVATION	BLOOD SUPPLY	MAIN ACTIONS
Stylopharyngeus m.	Longitudinal pharyngeal	Medial surface of styloid process of temporal bone	Pharyngeal wall, posterior border of thyroid cartilage	Glossopharyngeal nerve (CN IX)	Ascending pharyngeal and ascending palatine arteries, tonsillar branches of facial artery, dorsal lingual branches of lingual artery	Elevates pharynx and larynx during swallowing and speaking
Superior longitudinal lingual m.	Intrinsic tongue	Submucosa of posterior part of dorsum of tongue	Apex of tongue; (unites with muscle of opposite side)	Hypoglossal nerve (CN XII)	Deep lingual and facial arteries	Shortens tongue, turns tip and sides superiorly
Superior oblique m.	Extraocular	Body of sphenoid bone (above optic canal)	Sclera superior to corneoscleral junction (after passing through trochlea)	Trochlear nerve (CN IV)	Ophthalmic artery	Abducts, depresses, and medially rotates eyeball
Superior pharyngeal constrictor	Circular pharyngeal	Pterygoid hamulus, pterygomandibular raphe, mylohyoid line of mandible	Pharyngeal raphe	Vagus nerve (via pharyngeal plexus)	Ascending pharyngeal and ascending palatine arteries, tonsillar branches of facial artery, dorsal branches of lingual artery	Constricts wall of pharynx during swallowing
Superior rectus m.	Extraocular	Common tendinous ring	Sclera superior to corneoscleral junction	Oculomotor nerve (CN III)	Ophthalmic artery	Elevates, adducts, and medially rotates eyeball
Temporalis m.	Mastication	Temporal fossa, deep layer of temporal fascia	Coronoid process, ramus of mandible	Deep temporal nerves (branches of mandibular nerve)	Superficial temporal and maxillary arteries	Elevates mandible; posterior fibers retract mandible
Tensor tympani	Middle ear	Cartilage of auditory tube	Handle of malleus	Mandibular nerve (CN V_3)	Superior tympanic artery	Tenses tympanic membrane by drawing it medially
Tensor veli palatini	Palatal	Scaphoid fossa and spine of sphenoid bone, auditory tube	Palatine aponeurosis	Mandibular nerve (CN V_3)	Ascending and descending palatine arteries	Tenses soft palate, opens auditory tube during swallowing and yawning
Thyroarytenoid m.	Laryngeal	Internal surface of thyroid cartilage	Muscular process of arytenoid cartilage	Recurrent laryngeal nerve	Superior and inferior thyroid arteries	Shortens and relaxes vocal cords, sphincter of vestibule
Thyrohyoid m.	Infrahyoid	Oblique line of thyroid cartilage	Inferior border of body and greater horn of hyoid bone	Anterior ramus of C1 spinal nerve (via hypoglossal nerve)	Superior thyroid artery	Depresses larynx and hyoid bone, elevates larynx when hyoid bone is fixed
Transverse arytenoid m.	Laryngeal	Arytenoid cartilage	Opposite arytenoid cartilage	Recurrent laryngeal nerve	Superior and inferior thyroid arteries	Closes intercartilaginous portion of rima glottidis
Transversus linguae m.	Intrinsic tongue	Septum of tongue	Dorsum and margin of tongue	Hypoglossal nerve (CN XII)	Deep lingual and facial arteries	Narrows and elongates tongue
Verticalis linguae m.	Intrinsic tongue	Mucosa of anterior part of dorsum of tongue	Inferior surface of tongue	Hypoglossal nerve (CN XII)	Deep lingual and facial arteries	Flattens and broadens tongue
Vocalis m.	Laryngeal	Vocal process of arytenoid cartilage	Vocal ligament	Recurrent laryngeal nerve	Superior and inferior thyroid arteries	Tenses anterior part of vocal ligament, relaxes posterior part of vocal ligament
Zygomaticus major m.	Facial expression	Zygomatic arch	Modiolus of angle of mouth	Zygomatic and buccal branches of facial nerve	Superior labial artery	Draws angle of mouth posteriorly and superiorly
Zygomaticus minor m.	Facial expression	Zygomatic arch	Modiolus of angle of mouth, upper lip	Zygomatic and buccal branches of facial nerve	Superior labial artery	Elevates upper lip

Variations in spinal nerve contributions to the innervation of muscles, their arterial supply, their attachments, and their actions are common themes in human anatomy. Therefore, expect differences between texts and realize that anatomical variation is normal.

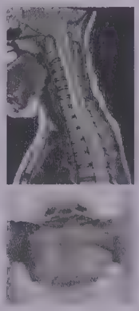
BACK 3

Surface Anatomy 178
Vertebral Column 179–185
Spinal Cord 186–194
Muscles and Nerves 195–199
Cross-Sectional Anatomy 200–201
Structures with High Clinical Significance Table 3.1
Muscles Tables 3.2–3.4
Electronic Bonus Plates BP 33–BP 40

ELECTRONIC BONUS PLATES

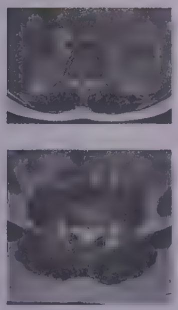
BP 33 Ligaments of Vertebral Column

BP 34 Cervical Spine: Radiographs

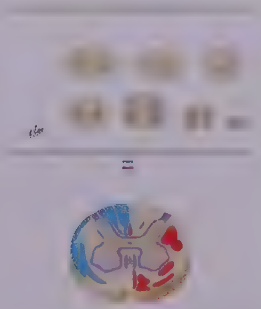

BP 35 Cervical Spine: MRI and Radiograph

BP 36 Thoracolumbar Spine: Lateral Radiograph

BP 37 Lumbar Vertebrae: Radiographs

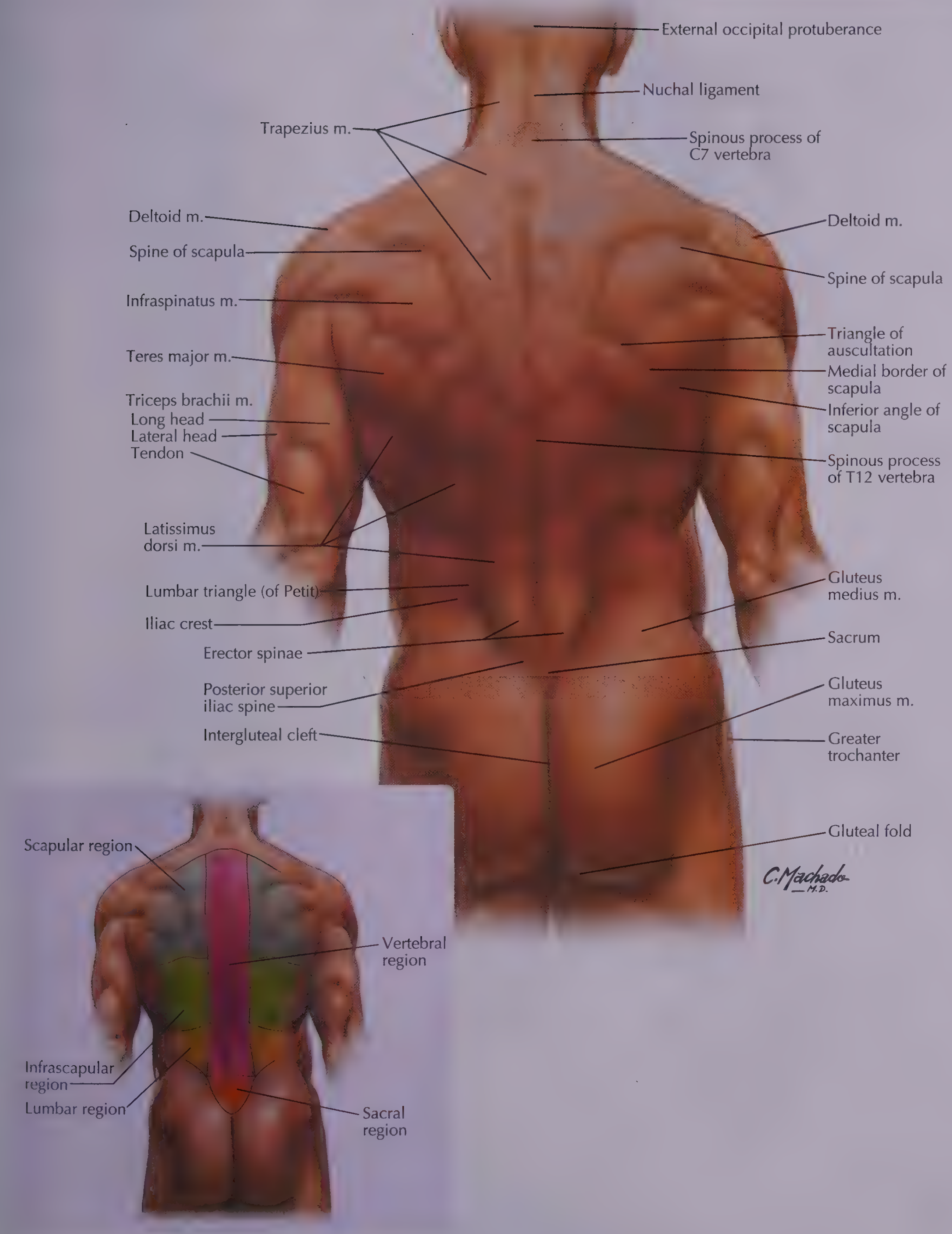

BP 38 Lumbar Spine: MRIs

BP 39 Vertebral Veins: Detail Showing Venous Communications

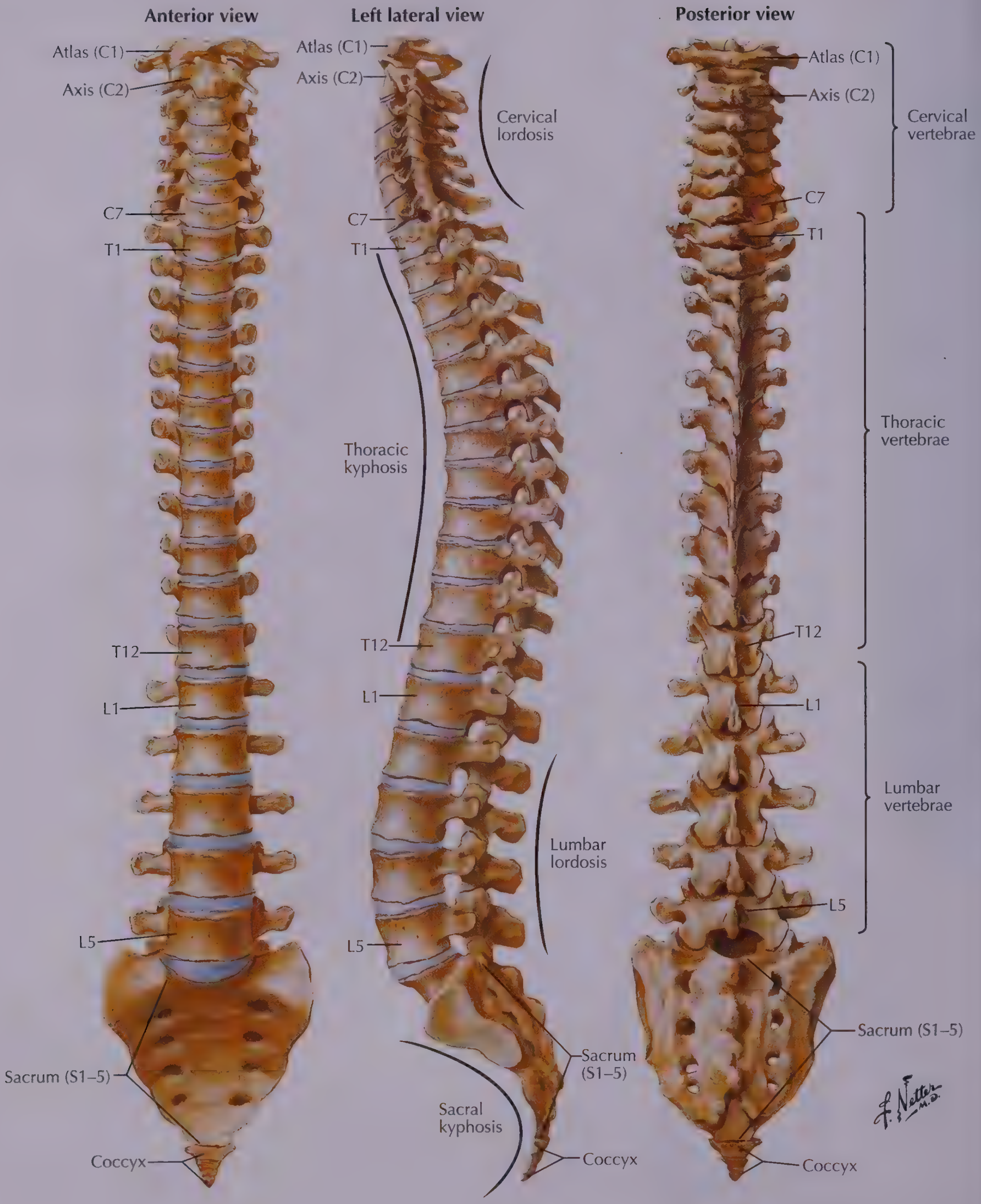

BP 40 Spinal Cord Cross Sections: Fiber Tracts

Surface Anatomy of Back

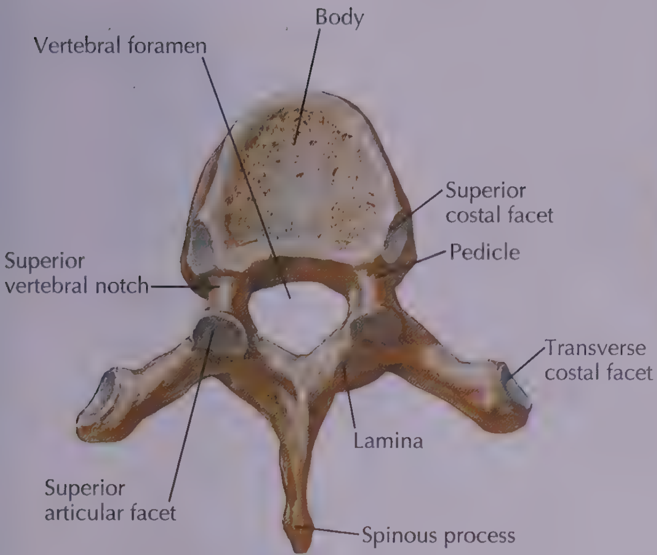
See also Plates 179, 188, 195


External occipital protuberance
Nuchal ligament
Trapezius m.
Spinous process of C7 vertebra
Deltoid m.
Deltoid m.
Spine of scapula
Spine of scapula
Infraspinatus m.
Teres major m.
Triangle of auscultation
Medial border of scapula
Triceps brachii m.
Long head
Lateral head
Tendon
Inferior angle of scapula
Spinous process of T12 vertebra
Latissimus dorsi m.
Gluteus medius m.
Lumbar triangle (of Petit)
Iliac crest
Sacrum
Erector spinae
Posterior superior iliac spine
Gluteus maximus m.
Intergluteal cleft
Greater trochanter
Gluteal fold
C.Machado M.D.
Scapular region
Vertebral region
Infrascapular region
Lumbar region
Sacral region

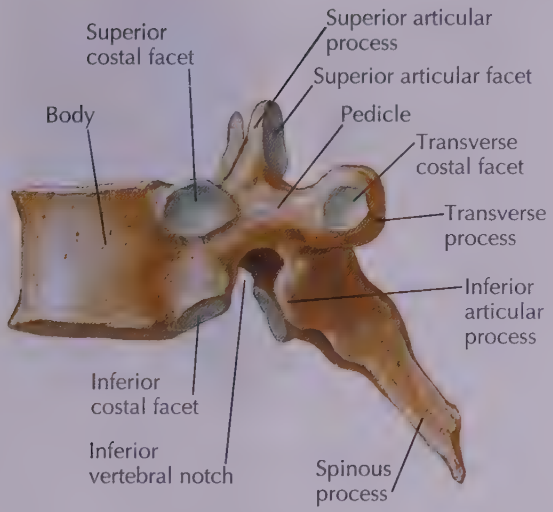
See also Plates 45, 203, 268, BP 36


Anterior view
Atlas (C1)
Axis (C2)
C7
T1
T12
L1
L5
Sacrum (S1–5)
Coccyx
Left lateral view
Atlas (C1)
Axis (C2)
Cervical lordosis
C7
T1
Thoracic kyphosis
T12
L1
Lumbar lordosis
L5
Sacrum (S1–5)
Sacral kyphosis
Coccyx
Posterior view
Atlas (C1)
Axis (C2)
Cervical vertebrae
C7
T1
Thoracic vertebrae
T12
L1
Lumbar vertebrae
L5
Sacrum (S1–5)
Coccyx
F. Netter M.D.

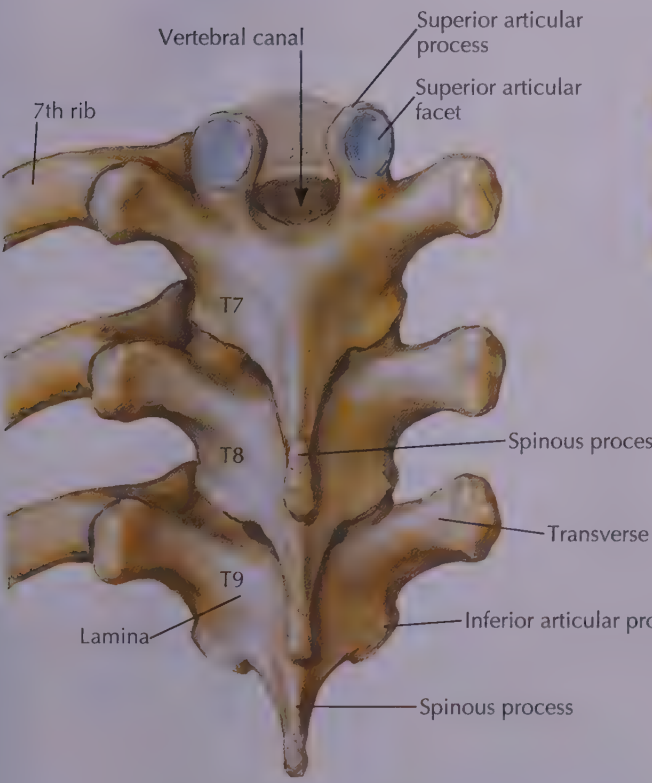
See also Plate BP 33


Body
Vertebral foramen
Superior costal facet
Pedicle
Superior vertebral notch
Transverse costal facet
Lamina
Superior articular facet
Spinous process

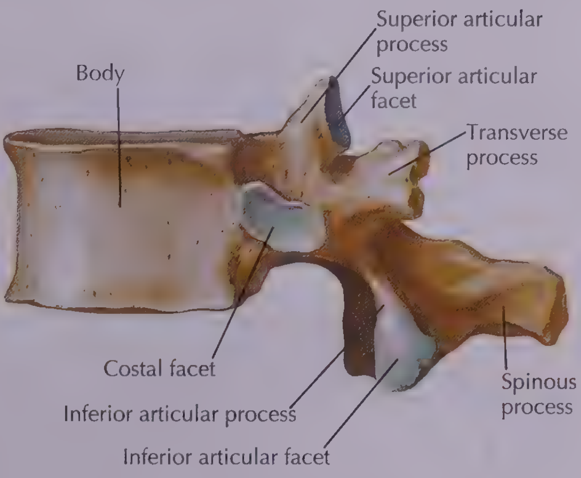
T6 vertebra (superior view)


Superior costal facet
Superior articular process
Superior articular facet
Body
Pedicle
Transverse costal facet
Transverse process
Inferior articular process
Inferior costal facet
Inferior vertebral notch
Spinous process

T6 vertebra (lateral view)


Vertebral canal
Superior articular process
Superior articular facet
7th rib
T7
T8
T9
Spinous process
Transverse process
Lamina
Inferior articular process
Spinous process

T7, T8, and T9 vertebrae (posterior view)


Superior articular process
Body
Superior articular facet
Transverse process
Costal facet
Inferior articular process
Spinous process
Inferior articular facet

T12 vertebra (lateral view)

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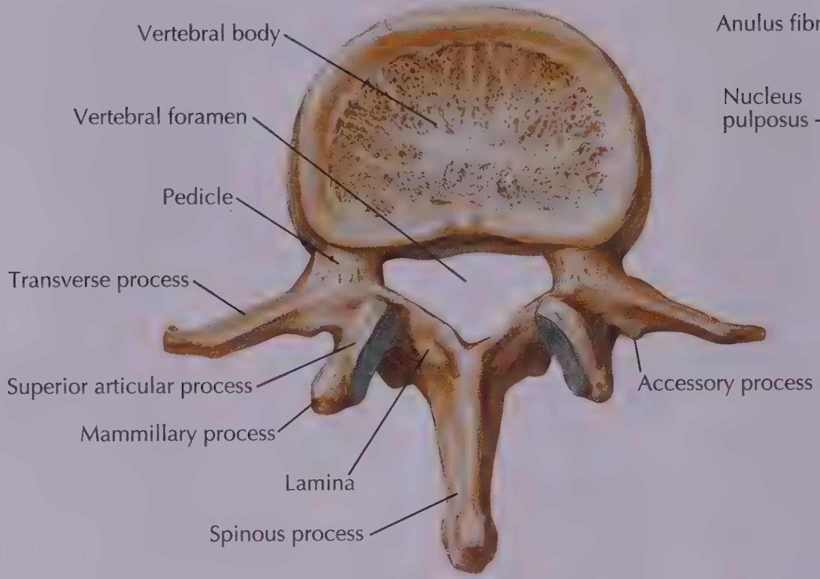
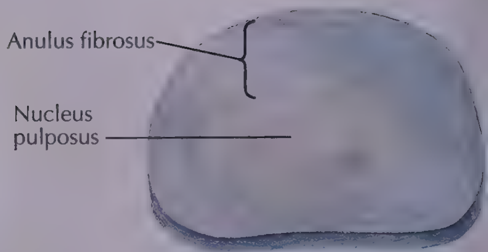
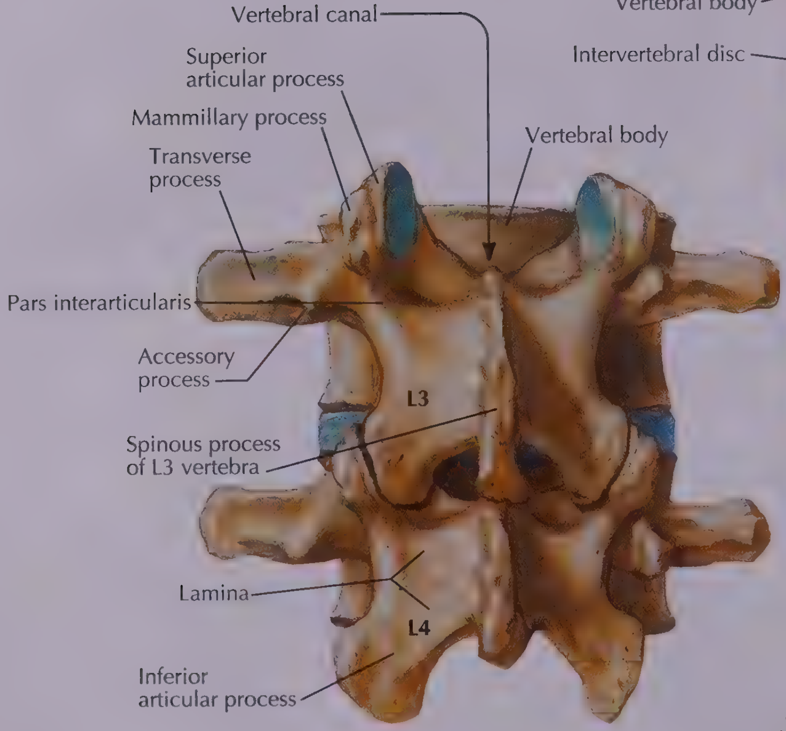
See also Plates BP 33, BP 37


Vertebral body
Vertebral foramen
Pedicle
Transverse process
Superior articular process
Mammillary process
Lamina
Spinous process
Accessory process

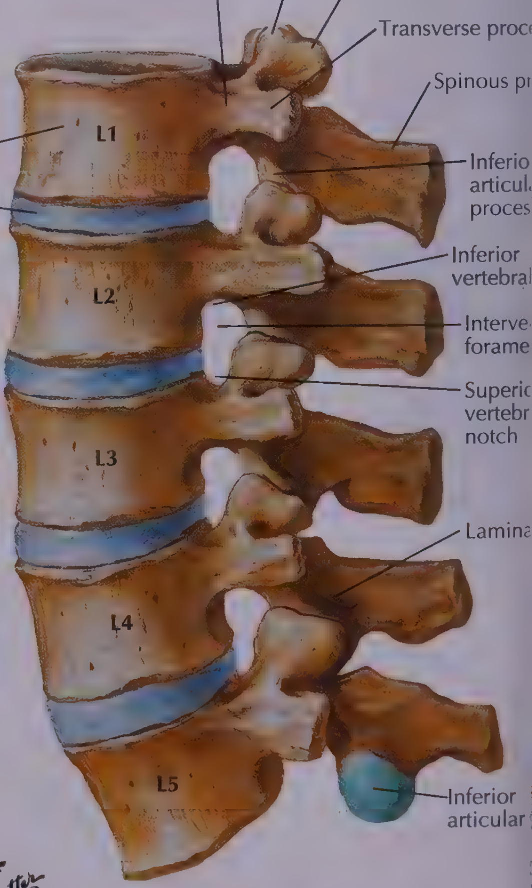
L2 vertebra
(superior view)


Anulus fibrosus
Nucleus pulposus

Intervertebral disc


Vertebral canal
Superior articular process
Mammillary process
Transverse process
Vertebral body
Pars interarticularis
Accessory process
L3
Spinous process of L3 vertebra
Lamina
L4
Inferior articular process

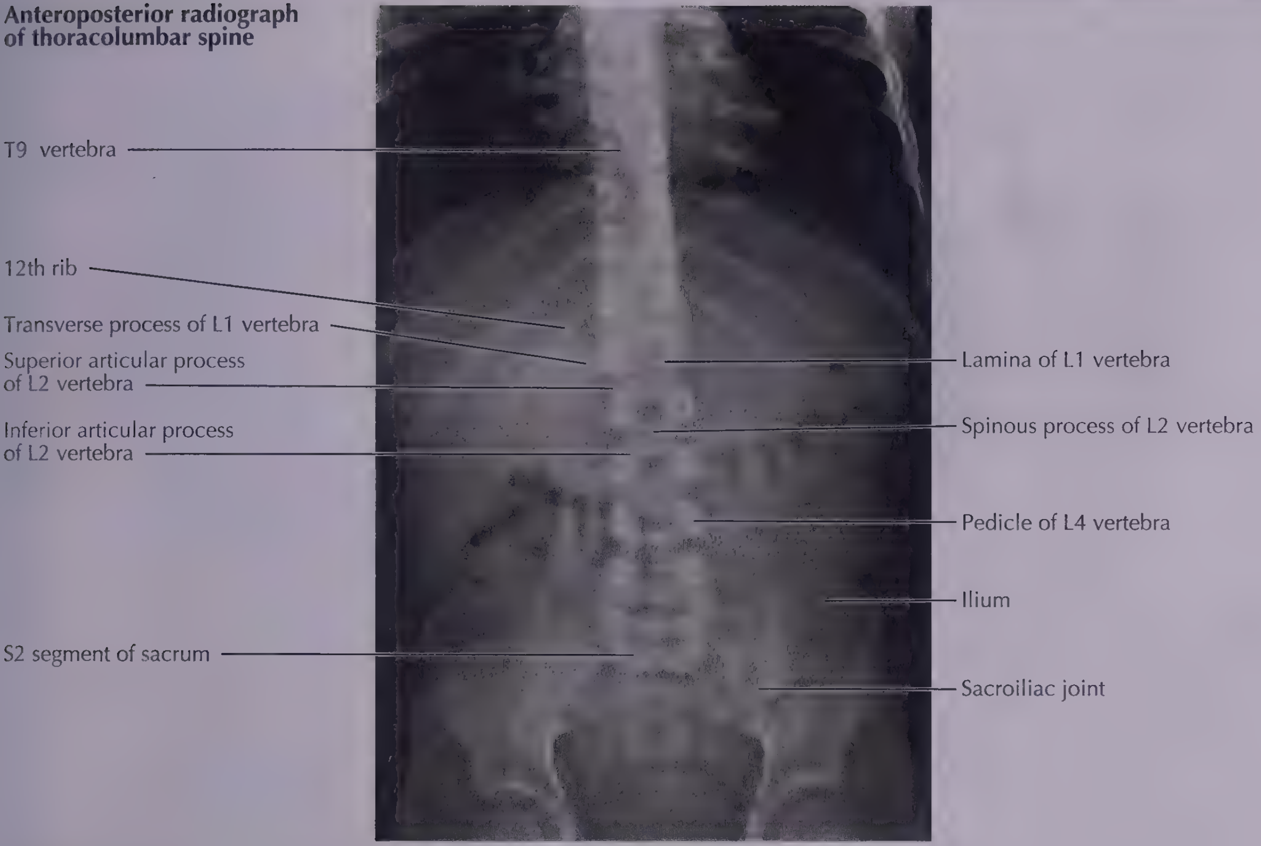
L3 and L4 vertebrae
(posterior view)


Superior articular proces
Mammillary proce
Transverse proc
Pedicle
Spinous pr
Vertebral body
Intervertebral disc
L1
Inferio articul proces
L2
Inferior vertebral
Interve forame
Superic vertebr notch
L3
Lamina
L4
L5
Inferior articular

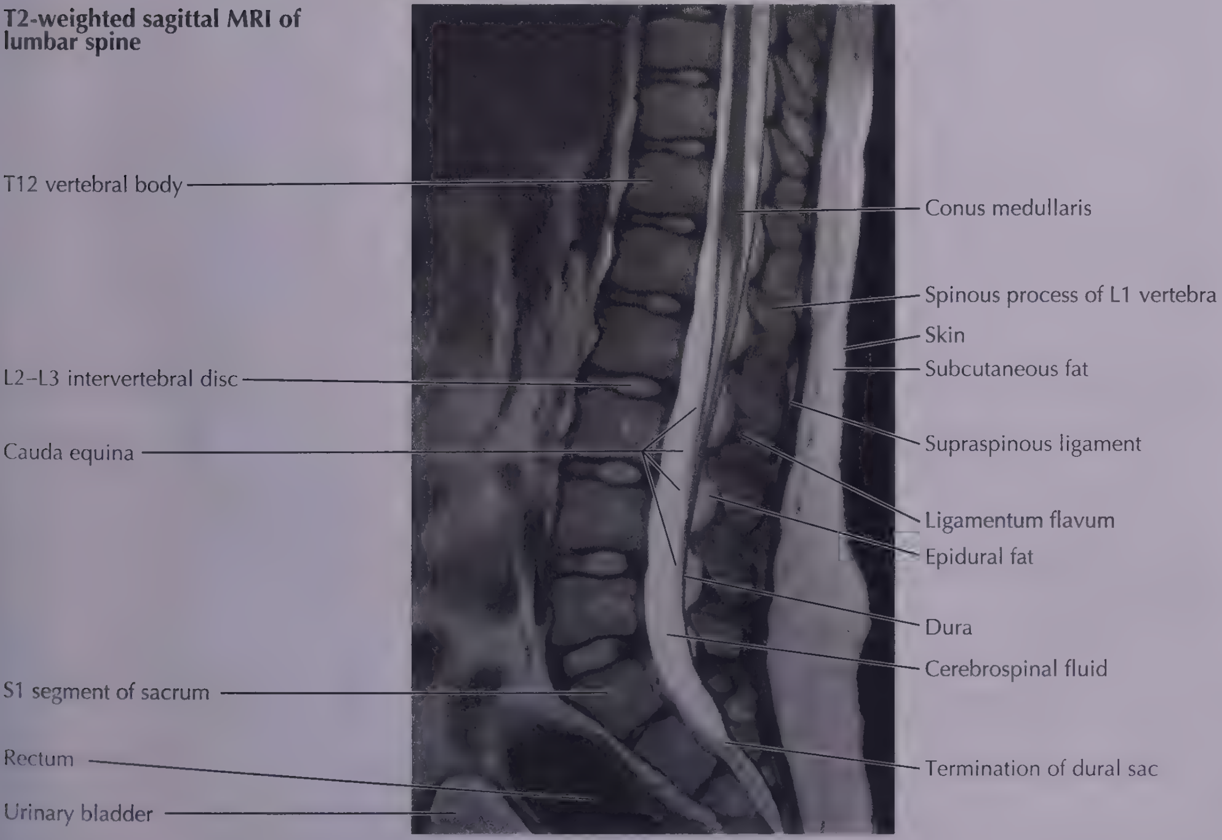
Lumbar vertebrae
(left lateral view)

See also Plates 179, 268, BP 36

Anteroposterior radiograph of thoracolumbar spine

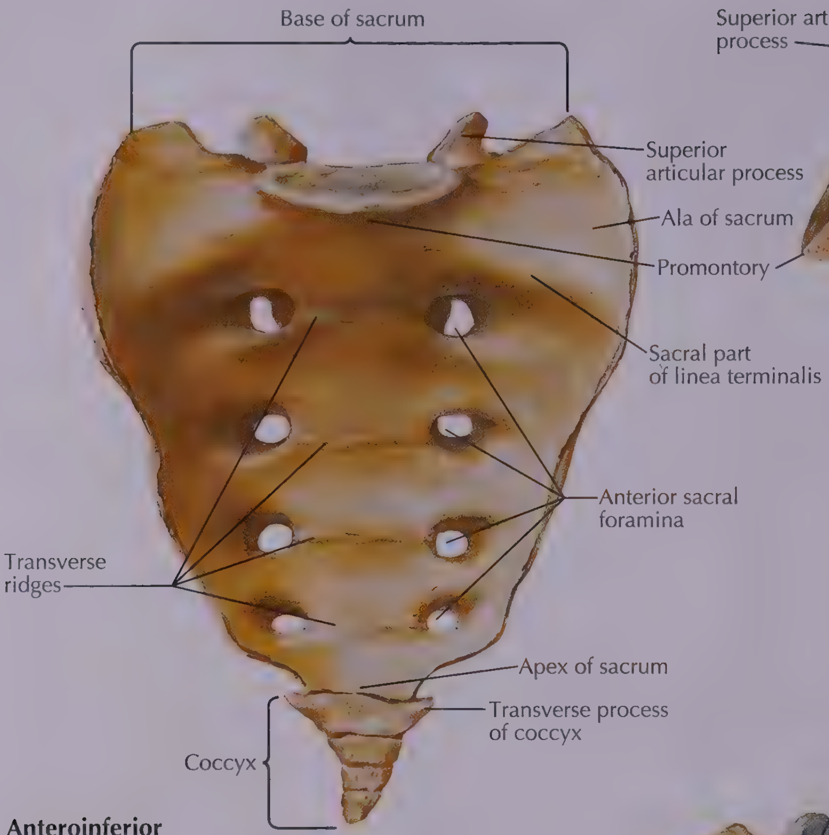

T9 vertebra
12th rib
Transverse process of L1 vertebra
Superior articular process of L2 vertebra
Inferior articular process of L2 vertebra
S2 segment of sacrum
Lamina of L1 vertebra
Spinous process of L2 vertebra
Pedicle of L4 vertebra
Ilium
Sacroiliac joint

T2-weighted sagittal MRI of lumbar spine


T12 vertebral body
L2–L3 intervertebral disc
Cauda equina
S1 segment of sacrum
Rectum
Urinary bladder
Conus medullaris
Spinous process of L1 vertebra
Skin
Subcutaneous fat
Supraspinous ligament
Ligamentum flavum
Epidural fat
Dura
Cerebrospinal fluid
Termination of dural sac

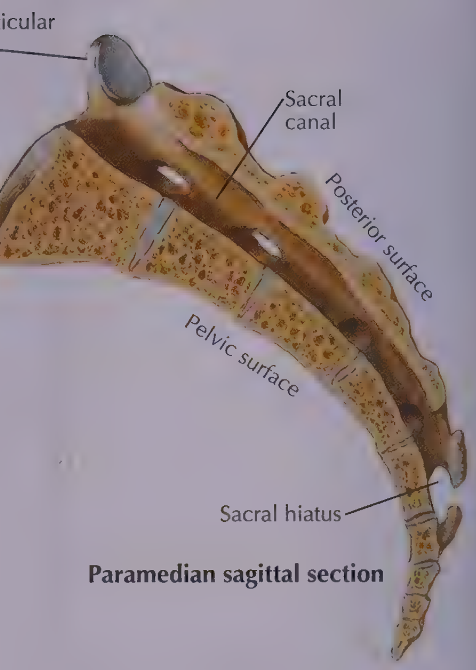
Sacrum and Coccyx

See also Plates 353, 357, BP 37

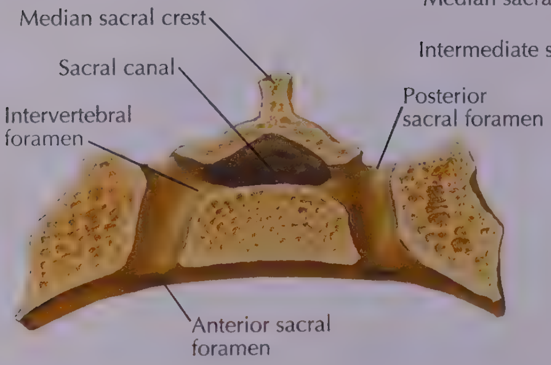

Base of sacrum
Superior articular process
Ala of sacrum
Promontory
Sacral part of linea terminalis
Anterior sacral foramina
Transverse ridges
Apex of sacrum
Transverse process of coccyx
Coccyx

Anteroinferior view

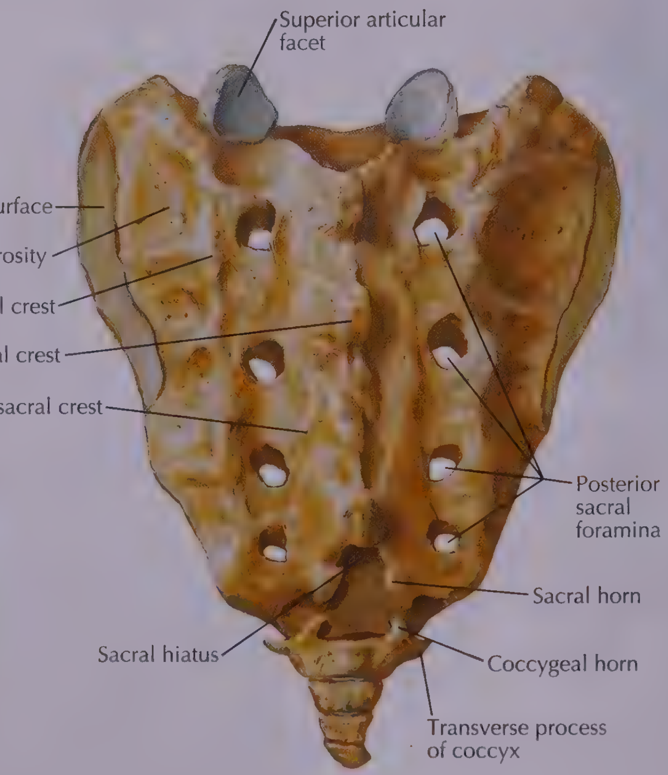
Pelvic surface


Superior articular process
Sacral canal
Posterior surface
Promontory
Pelvic surface
Sacral hiatus

Paramedian sagittal section


Median sacral crest
Sacral canal
Intervertebral foramen
Posterior sacral foramen
Anterior sacral foramen

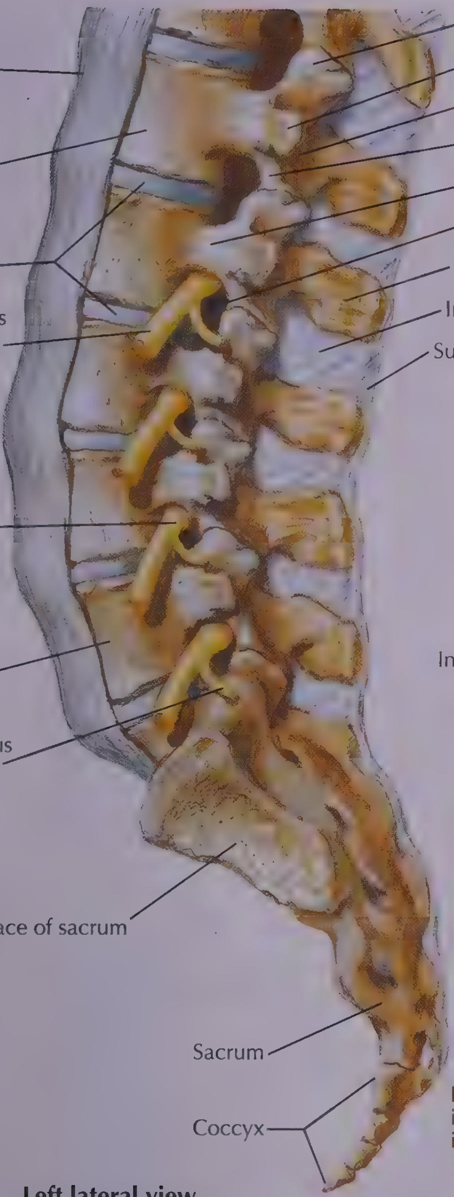
Transverse section through S2 foramina


Superior articular facet
Auricular surface
Sacral tuberosity
Lateral sacral crest
Median sacral crest
Intermediate sacral crest
Posterior sacral foramina
Sacral horn
Sacral hiatus
Coccygeal horn
Transverse process of coccyx

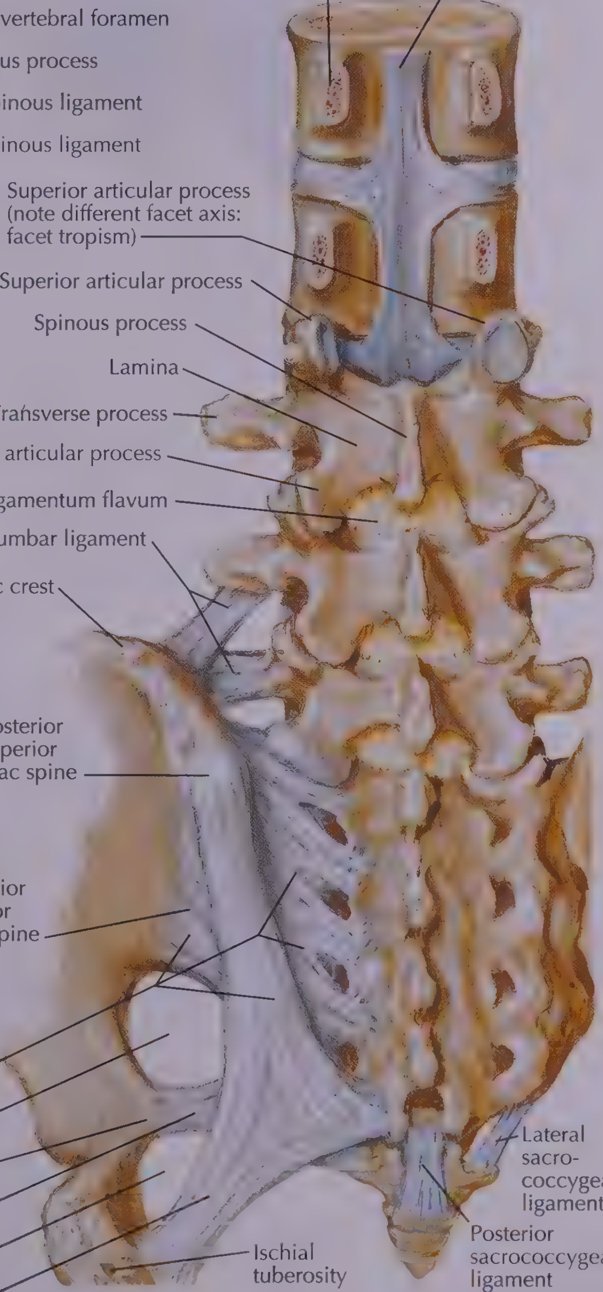
Posterosuperior view

Ligaments of Vertebral Column: Lumbosacral Region

See also Plate BP 33


Anterior longitudinal ligament
Body of L1 vertebra
Intervertebral discs
Anterior ramus of L2 spinal n.
L4 spinal n.
Body of L5 vertebra
Posterior ramus of L5 spinal n.
Auricular surface of sacrum
Superior articular process
Transverse process
Lamina
Inferior articular process
Pedicle
Intervertebral foramen
Spinous process
Interspinous ligament
Supraspinous ligament
Sacrum
Coccyx

Left lateral view


Pedicle (*cut*)
Posterior longitudinal ligament
Superior articular process (note different facet axis: facet tropism)
Superior articular process
Spinous process
Lamina
Transverse process
Inferior articular process
Ligamentum flavum
Iliolumbar ligament
Iliac crest
Posterior superior iliac spine
Posterior inferior iliac spine
Posterior sacroiliac ligaments
Greater sciatic foramen
Ischial spine
Sacrospinous ligament
Lesser sciatic foramen
Sacrotuberous ligament
Ischial tuberosity
Lateral sacrococcygeal ligament
Posterior sacrococcygeal ligament

Posterior view

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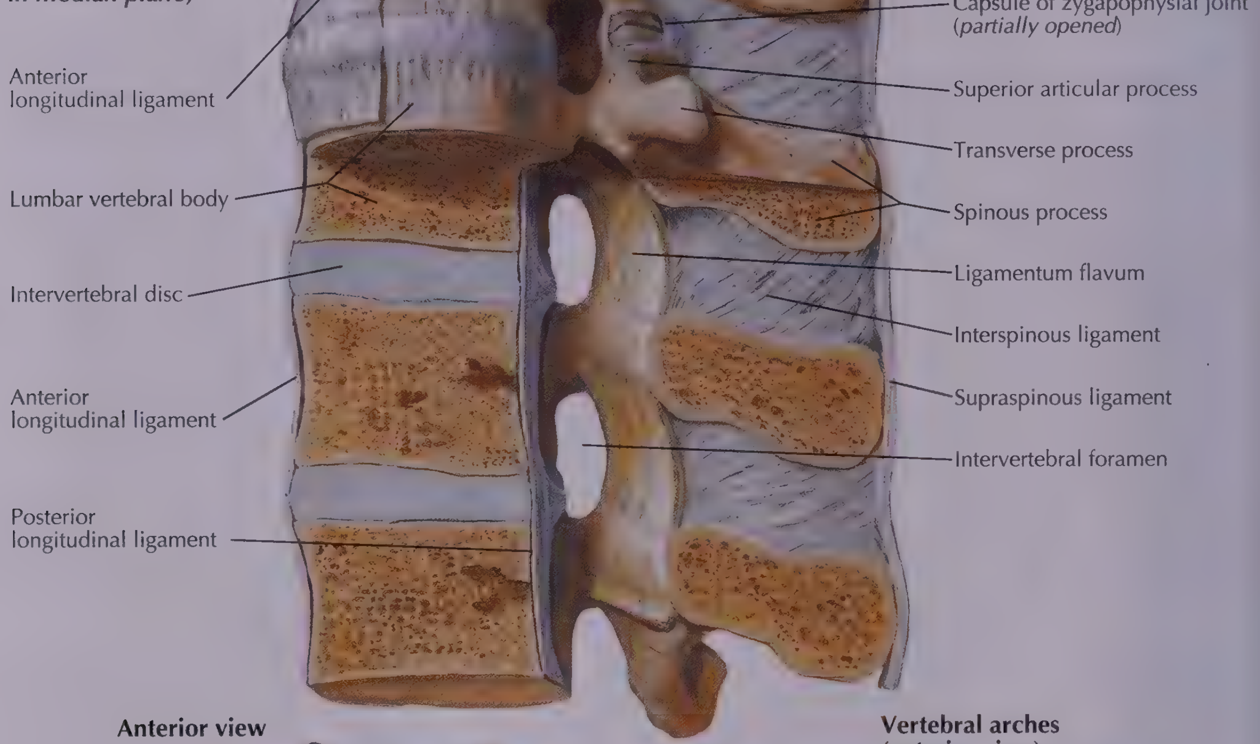
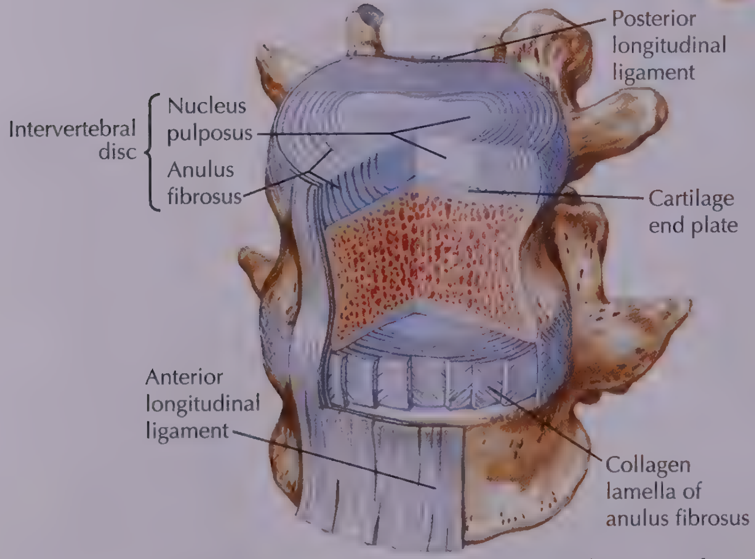
Joints of Vertebral Column: Lumbar Region

Left lateral view
(partially sectioned in median plane)


Anterior longitudinal ligament
Lumbar vertebral body
Intervertebral disc
Anterior longitudinal ligament
Posterior longitudinal ligament
Inferior articular process
Capsule of zygapophysial joint (*partially opened*)
Superior articular process
Transverse process
Spinous process
Ligamentum flavum
Interspinous ligament
Supraspinous ligament
Intervertebral foramen

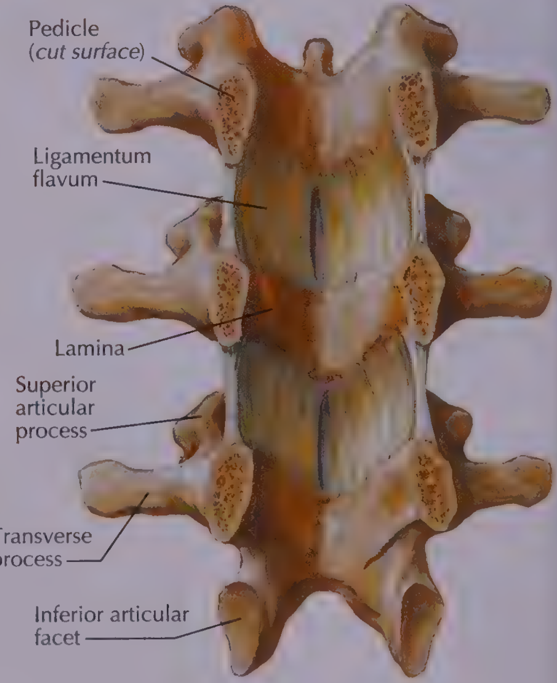
Anterior view


Posterior longitudinal ligament
Intervertebral disc
Nucleus pulposus
Anulus fibrosus
Cartilage end plate
Anterior longitudinal ligament
Collagen lamella of anulus fibrosus

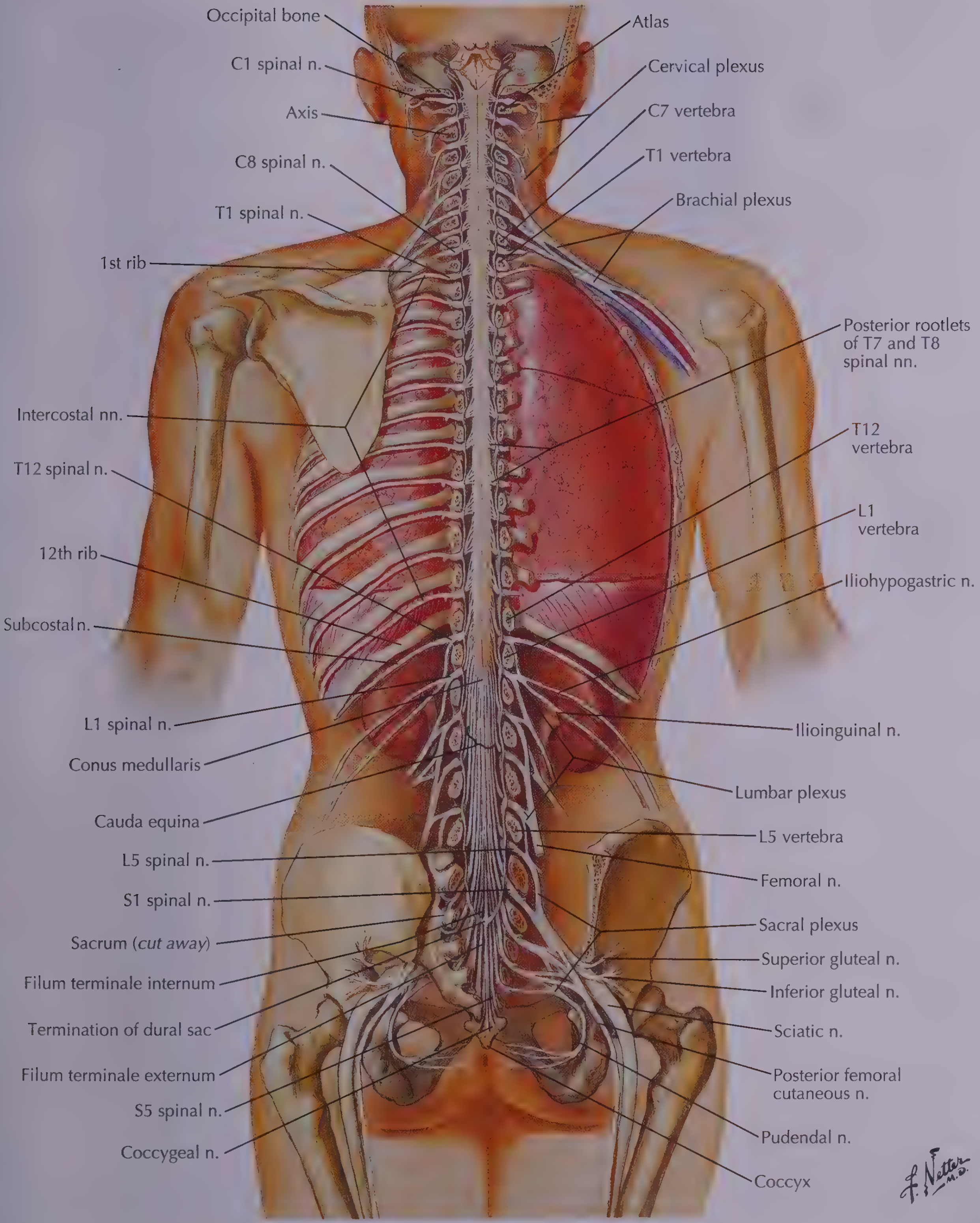
Intervertebral disc composed of central nuclear zone of collagen and hydrated proteoglycans surrounded by concentric lamellae of collagen fibers

F. Netter M.D. C. Machado M.D.

Vertebral arches (anterior view)

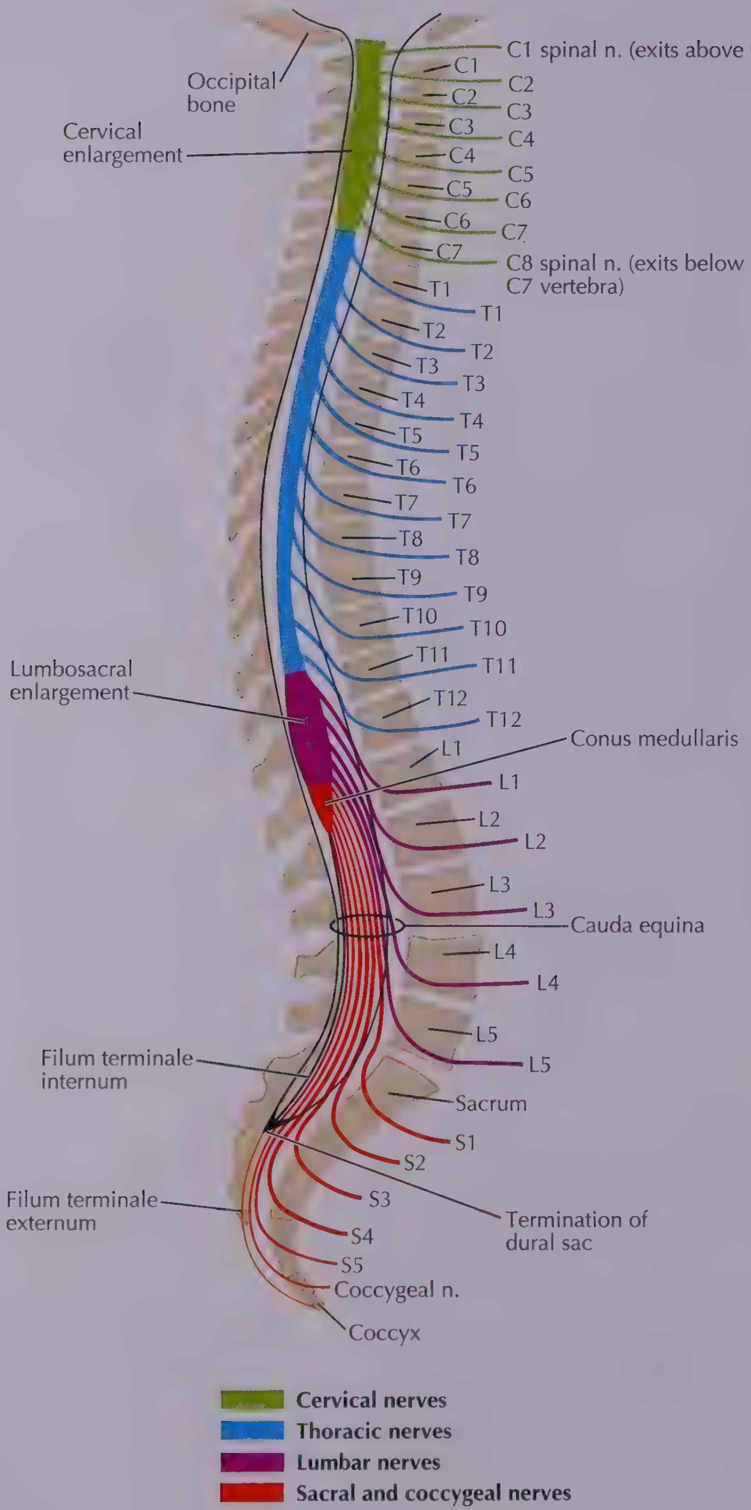

Pedicle (*cut surface*)
Ligamentum flavum
Lamina
Superior articular process
Transverse process
Inferior articular facet

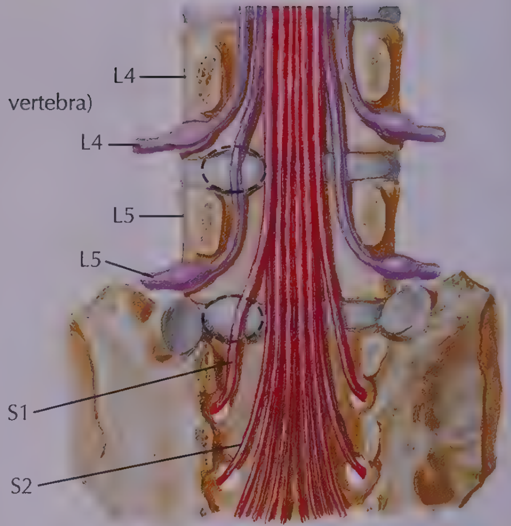
See also Plates 156, 439, 507, 508


Occipital bone
C1 spinal n.
Axis
C8 spinal n.
T1 spinal n.
1st rib
Intercostal nn.
T12 spinal n.
12th rib
Subcostal n.
L1 spinal n.
Conus medullaris
Cauda equina
L5 spinal n.
S1 spinal n.
Sacrum (*cut away*)
Filum terminale internum
Termination of dural sac
Filum terminale externum
S5 spinal n.
Coccygeal n.
Atlas
Cervical plexus
C7 vertebra
T1 vertebra
Brachial plexus
Posterior rootlets of T7 and T8 spinal nn.
T12 vertebra
L1 vertebra
Iliohypogastric n.
Ilioinguinal n.
Lumbar plexus
L5 vertebra
Femoral n.
Sacral plexus
Superior gluteal n.
Inferior gluteal n.
Sciatic n.
Posterior femoral cutaneous n.
Pudendal n.
Coccyx
F. Netter M.D.

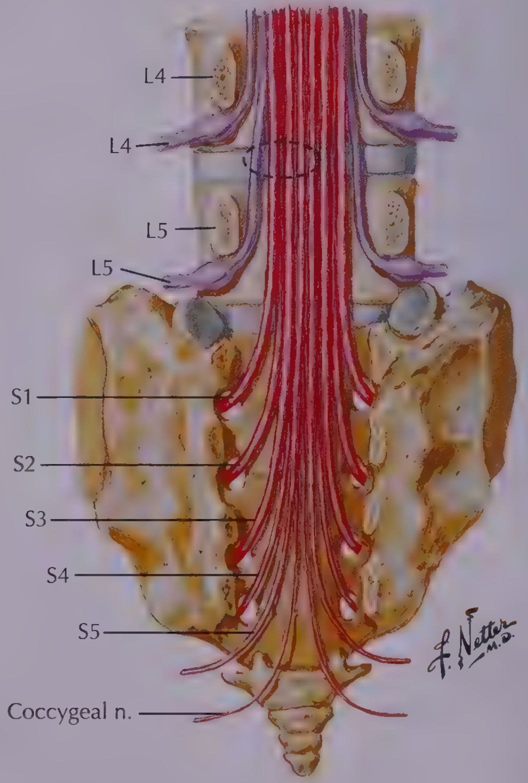
Spinal Nerve Roots and Vertebrae

See also Plate 188


Occipital bone
Cervical enlargement
C1 spinal n. (exits above C1 vertebra)
C1
C2
C2
C3
C3
C4
C4
C5
C5
C6
C6
C7
C7
C8 spinal n. (exits below C7 vertebra)
T1
T1
T2
T2
T3
T3
T4
T4
T5
T5
T6
T6
T7
T7
T8
T8
T9
T9
T10
T10
T11
T11
T12
T12
Lumbosacral enlargement
Conus medullaris
L1
L1
L2
L2
L3
L3
Cauda equina
L4
L4
L5
L5
Filum terminale internum
Sacrum
S1
S2
S3
Filum terminale externum
Termination of dural sac
S4
S5
Coccygeal n.
Coccyx
🟩 Cervical nerves
🟦 Thoracic nerves
🟪 Lumbar nerves
🟥 Sacral and coccygeal nerves


L4
L4
L5
L5
S1
S2

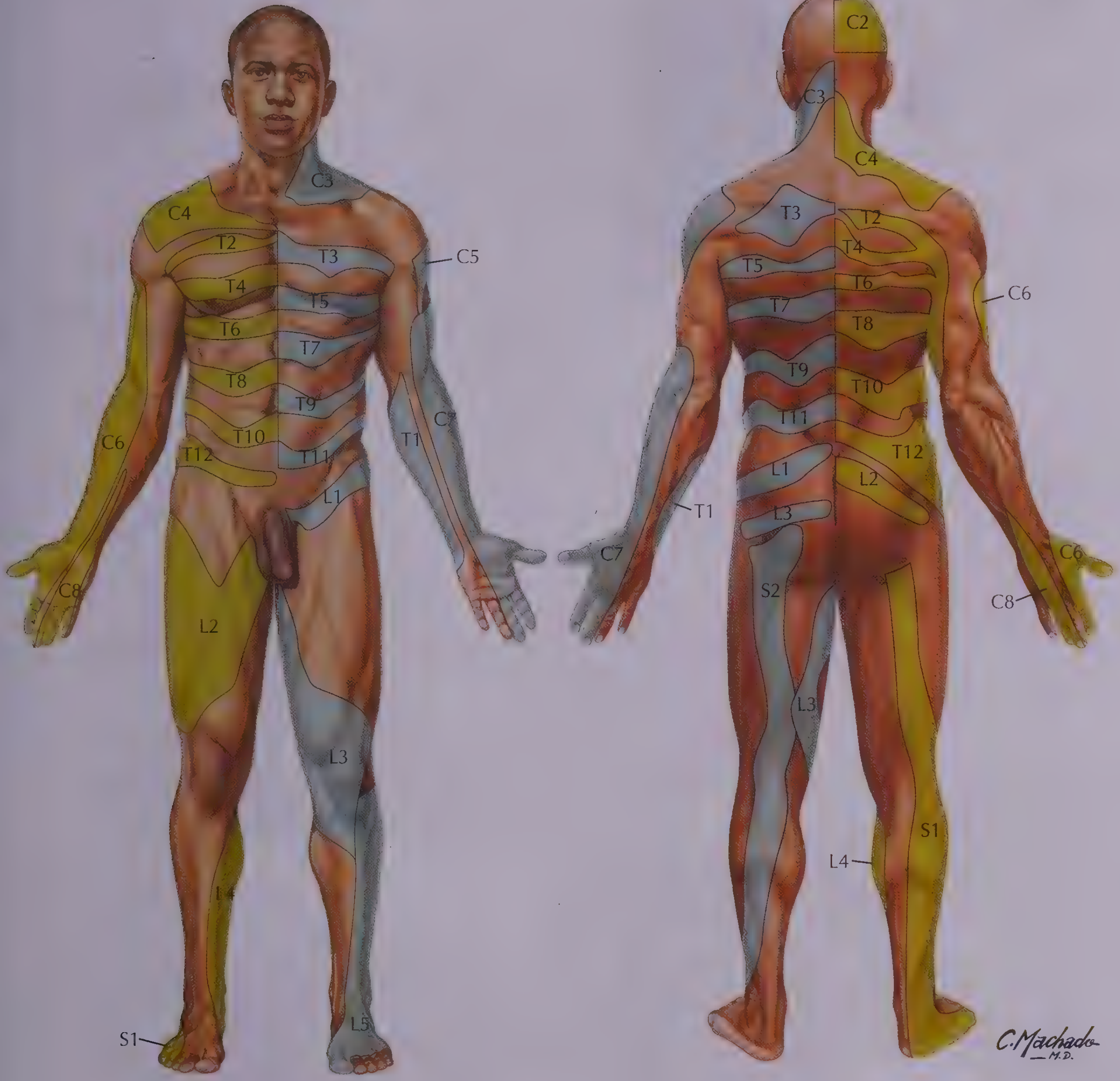
Lumbar disc protrusion does not usually affect nerve exiting above disc. Lateral protrusion (*dashed oval*) of L4/5 intervertebral disc affects L5 spinal nerve roots, not L4 spinal nerve roots. Protrusion of L5/S1 intervertebral disc affects S1 spinal nerve roots, not L5 spinal nerve roots.


L4
L4
L5
L5
S1
S2
S3
S4
S5
Coccygeal n.
F. Netter M.D.

Medial protrusion of L4/5 intervertebral disc (*dashed oval*) rarely affects L4 spinal nerve roots but might affect L5 spinal nerve roots and sometimes S1–4 spinal nerve roots.

Dermatomes

See also Plate 187

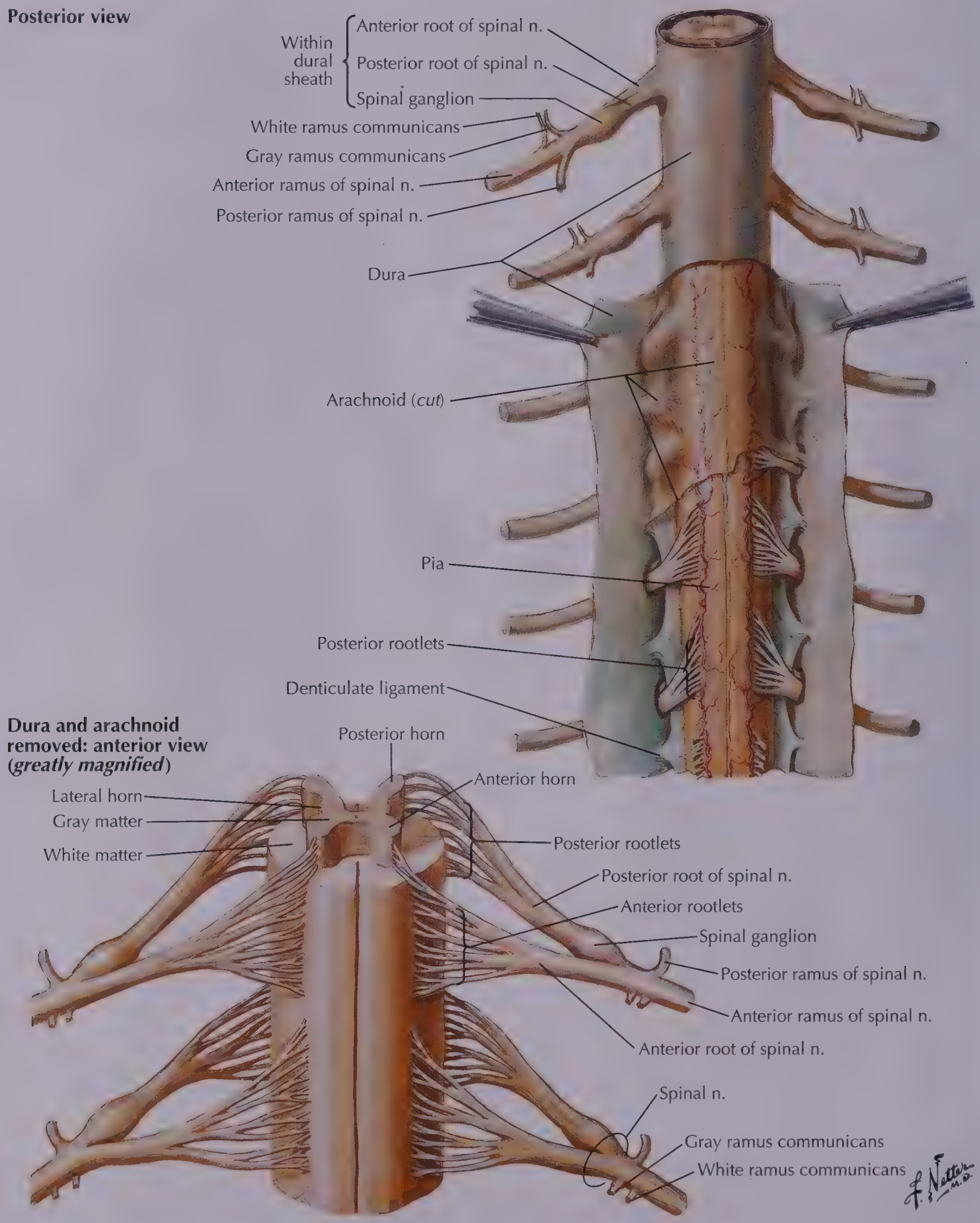

C3
C4
T2
T3
C5
T4
T5
T6
T7
T8
T9
C7
T10
T1
C6
T12
T11
L1
C8
L2
L3
L4
S1
L5
C2
C3
C4
T3
T2
T4
T5
T6
C6
T7
T8
T9
T10
T11
T12
L1
L2
T1
L3
C7
C6
S2
C8
L3
S1
L4
C. Machado M.D.

Levels of principal dermatomes

C4	Level of clavicles
C5, C6, C7	Lateral surfaces of upper limbs
C8, T1	Medial surfaces of upper limbs
C6	Lateral digits
C6, C7, C8	Hand
C8	Medial digits
T4	Level of nipples
T10	Level of umbilicus
L1	Inguinal region and proximal anterior thigh
L1, L2, L3, L4	Anteromedial lower limb and gluteal region
L4, L5, S1	Foot
L4	Medial leg
L5, S1	Posterolateral lower limb and dorsum of foot
S1	Lateral foot

Schematic based on Lee MW, McPhee RW, Stringer MD. An evidence-based approach to human dermatomes. Clin Anat. 2008; 21(5):363–373. doi: 10.1002/ca.20636. PMID: 18470936. Please note that these areas are not absolute and vary from person to person. S3, S4, S5, and Co supply the perineum but are not shown for reasons of clarity. Of note, the dermatomes are larger than illustrated as the figure is based on best evidence; gaps represent areas in which the data are inconclusive.

See also Plate BP 40



Posterior view

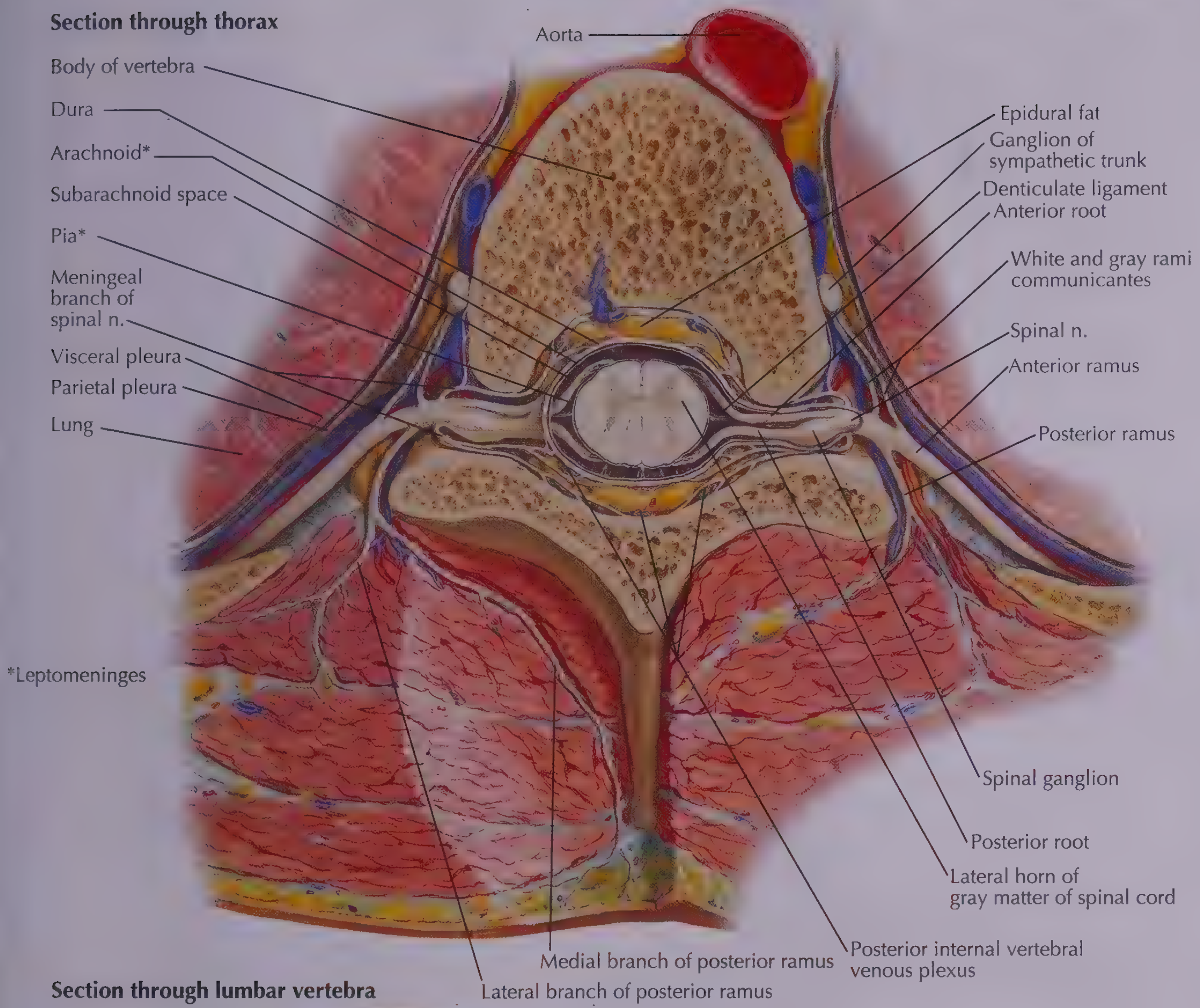
Within dural sheath
Anterior root of spinal n.
Posterior root of spinal n.
Spinal ganglion
White ramus communicans
Gray ramus communicans
Anterior ramus of spinal n.
Posterior ramus of spinal n.
Dura
Arachnoid (*cut*)
Pia
Posterior rootlets
Denticulate ligament

Dura and arachnoid removed: anterior view (*greatly magnified*)

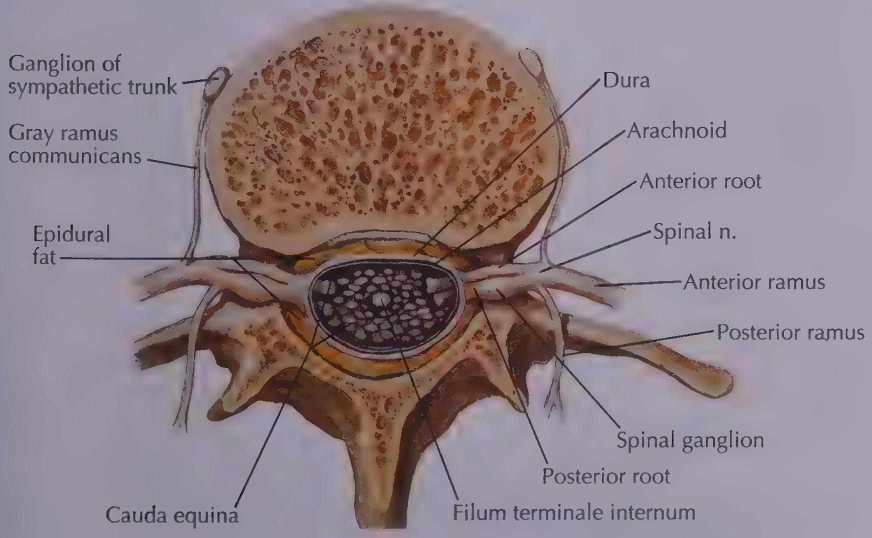
Posterior horn
Anterior horn
Lateral horn
Gray matter
White matter
Posterior rootlets
Posterior root of spinal n.
Anterior rootlets
Spinal ganglion
Posterior ramus of spinal n.
Anterior ramus of spinal n.
Anterior root of spinal n.
Spinal n.
Gray ramus communicans
White ramus communicans

See also Plate BP 40

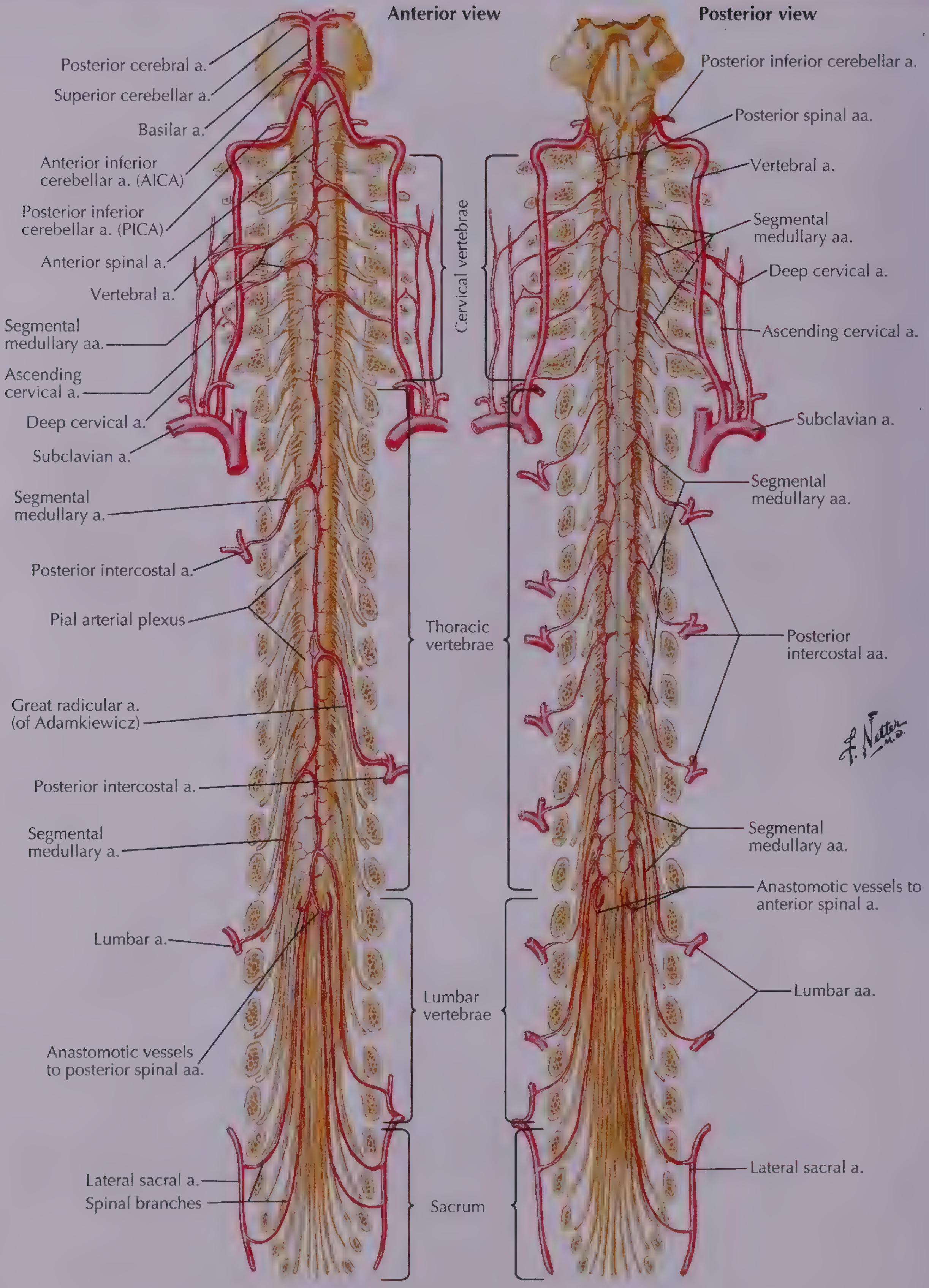
Section through thorax


Aorta
Body of vertebra
Dura
Arachnoid*
Subarachnoid space
Pia*
Meningeal branch of spinal n.
Visceral pleura
Parietal pleura
Lung
Epidural fat
Ganglion of sympathetic trunk
Denticulate ligament
Anterior root
White and gray rami communicantes
Spinal n.
Anterior ramus
Posterior ramus
*Leptomeninges
Spinal ganglion
Posterior root
Lateral horn of gray matter of spinal cord
Posterior internal vertebral venous plexus
Medial branch of posterior ramus
Lateral branch of posterior ramus

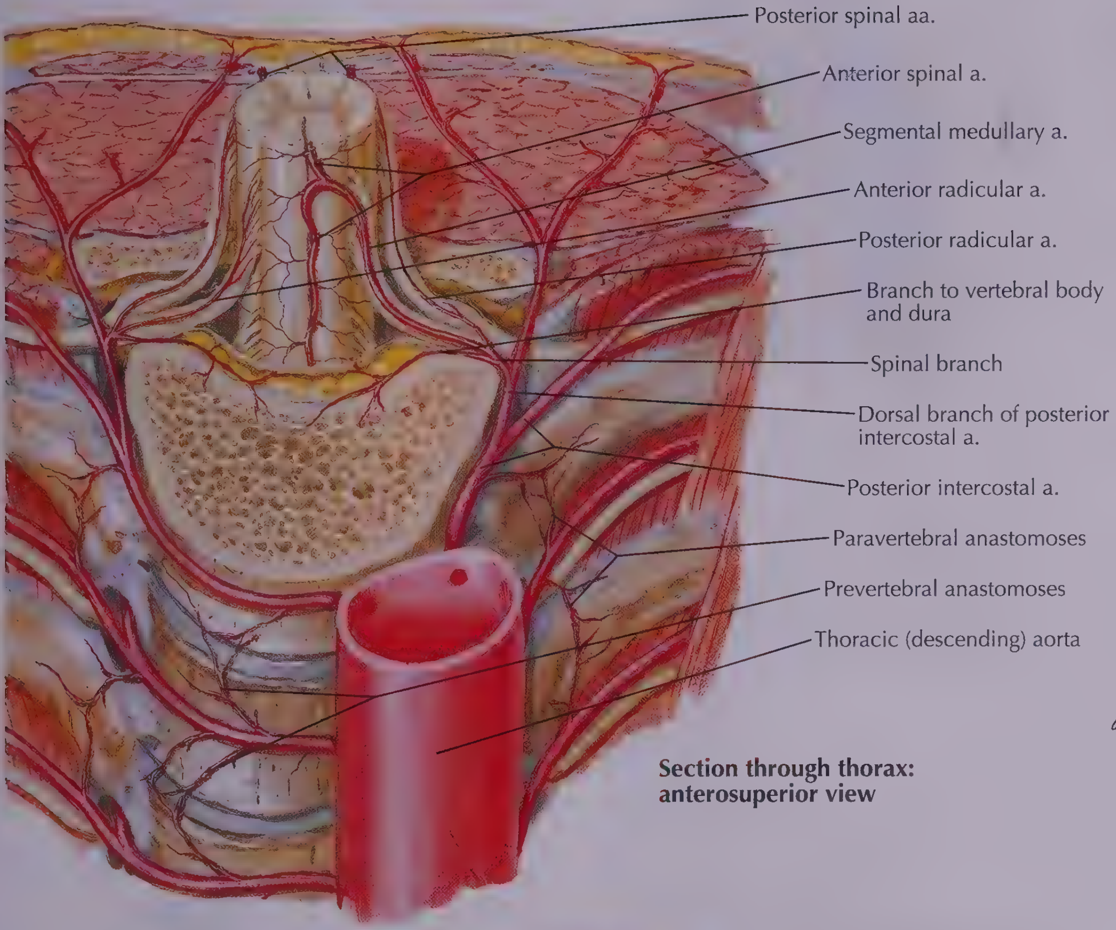
Section through lumbar vertebra


Ganglion of sympathetic trunk
Gray ramus communicans
Epidural fat
Dura
Arachnoid
Anterior root
Spinal n.
Anterior ramus
Posterior ramus
Spinal ganglion
Posterior root
Filum terminale internum
Cauda equina

Arteries of Spinal Cord: Schema


Anterior view
Posterior view
Posterior cerebral a.
Superior cerebellar a.
Basilar a.
Anterior inferior cerebellar a. (AICA)
Posterior inferior cerebellar a. (PICA)
Anterior spinal a.
Vertebral a.
Segmental medullary aa.
Ascending cervical a.
Deep cervical a.
Subclavian a.
Segmental medullary a.
Posterior intercostal a.
Pial arterial plexus
Great radicular a. (of Adamkiewicz)
Posterior intercostal a.
Segmental medullary a.
Lumbar a.
Anastomotic vessels to posterior spinal aa.
Lateral sacral a.
Spinal branches
Cervical vertebrae
Thoracic vertebrae
Lumbar vertebrae
Sacrum
Posterior inferior cerebellar a.
Posterior spinal aa.
Vertebral a.
Segmental medullary aa.
Deep cervical a.
Ascending cervical a.
Subclavian a.
Segmental medullary aa.
Posterior intercostal aa.
Segmental medullary aa.
Anastomotic vessels to anterior spinal a.
Lumbar aa.
Lateral sacral a.

Note: All spinal nerve roots have associated radicular or segmental medullary arteries. Most roots have radicular arteries (see Plate 192). Both types of arteries run along roots, but radicular arteries end before reaching anterior or posterior spinal arteries; larger segmental medullary arteries continue on to supply a segment of these arteries.


Posterior spinal aa.
Anterior spinal a.
Segmental medullary a.
Anterior radicular a.
Posterior radicular a.
Branch to vertebral body and dura
Spinal branch
Dorsal branch of posterior intercostal a.
Posterior intercostal a.
Paravertebral anastomoses
Prevertebral anastomoses
Thoracic (descending) aorta
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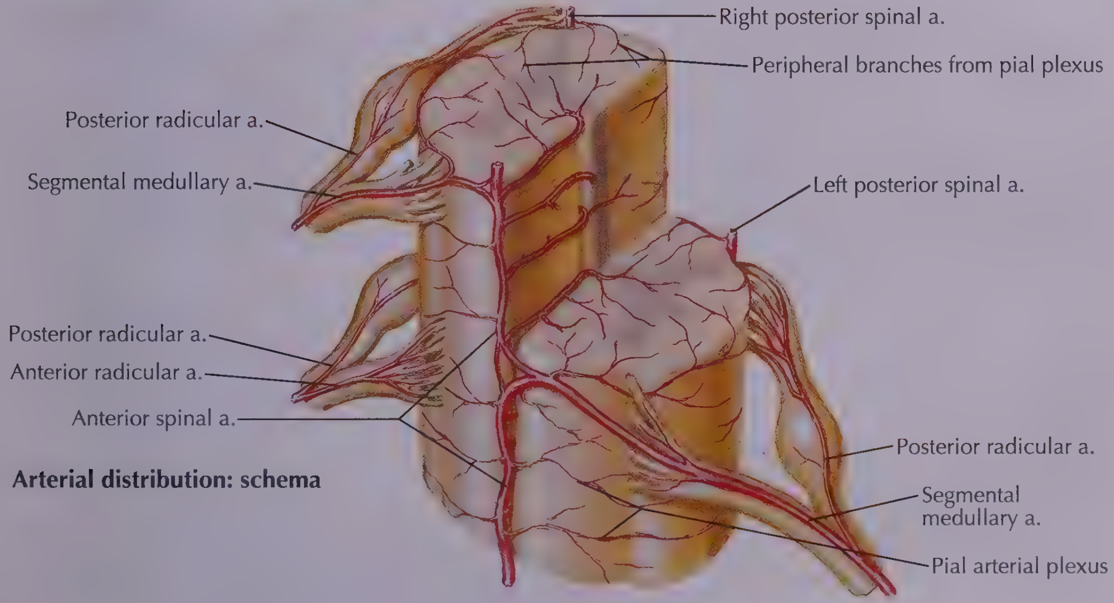
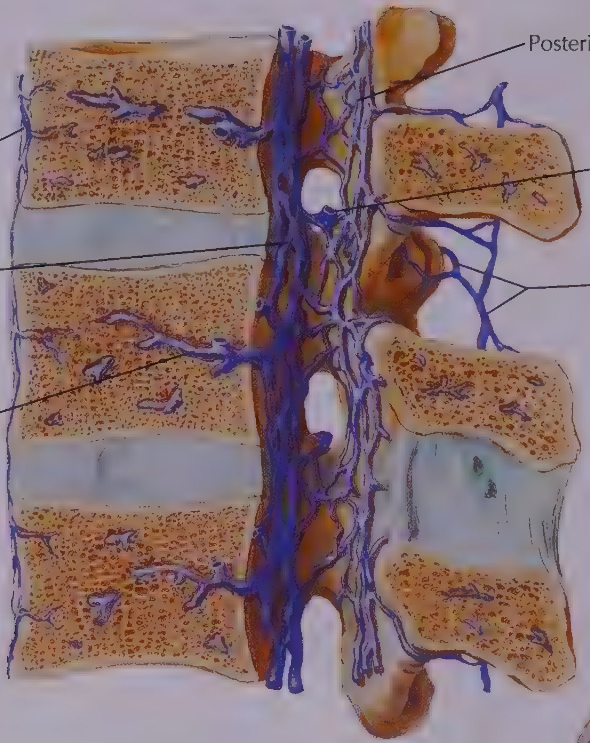
Section through thorax: anterosuperior view

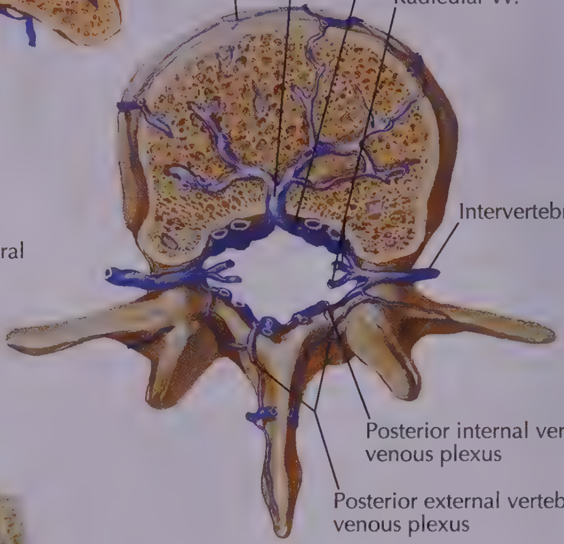

Right posterior spinal a.
Peripheral branches from pial plexus
Posterior radicular a.
Segmental medullary a.
Left posterior spinal a.
Posterior radicular a.
Anterior radicular a.
Anterior spinal a.
Posterior radicular a.
Segmental medullary a.
Pial arterial plexus

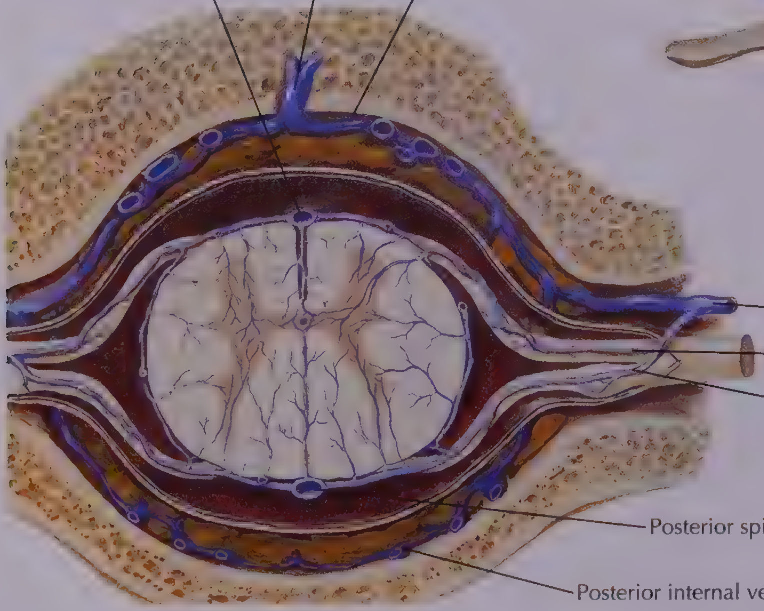
Arterial distribution: schema

Veins of Spinal Cord and Vertebral Column

See also Plate BP 39


Posterior internal vertebral venous plexus
Anterior external vertebral venous plexus
Intervertebral v.
Anterior internal vertebral venous plexus
Posterior external vertebral venous plexus
Basivertebral v.


Anterior external vertebral venous plexus
Basivertebral v.
Anterior internal vertebral venous plexus
Radicular vv.
Intervertebral v.
Posterior internal vertebral venous plexus
Posterior external vertebral venous plexus


Anterior spinal v.
Basivertebral v.
Anterior internal vertebral venous plexus
Intervertebral v.
Anterior segmental medullary v.
Posterior segmental medullary v.
Posterior spinal v.
Posterior internal vertebral venous plexus

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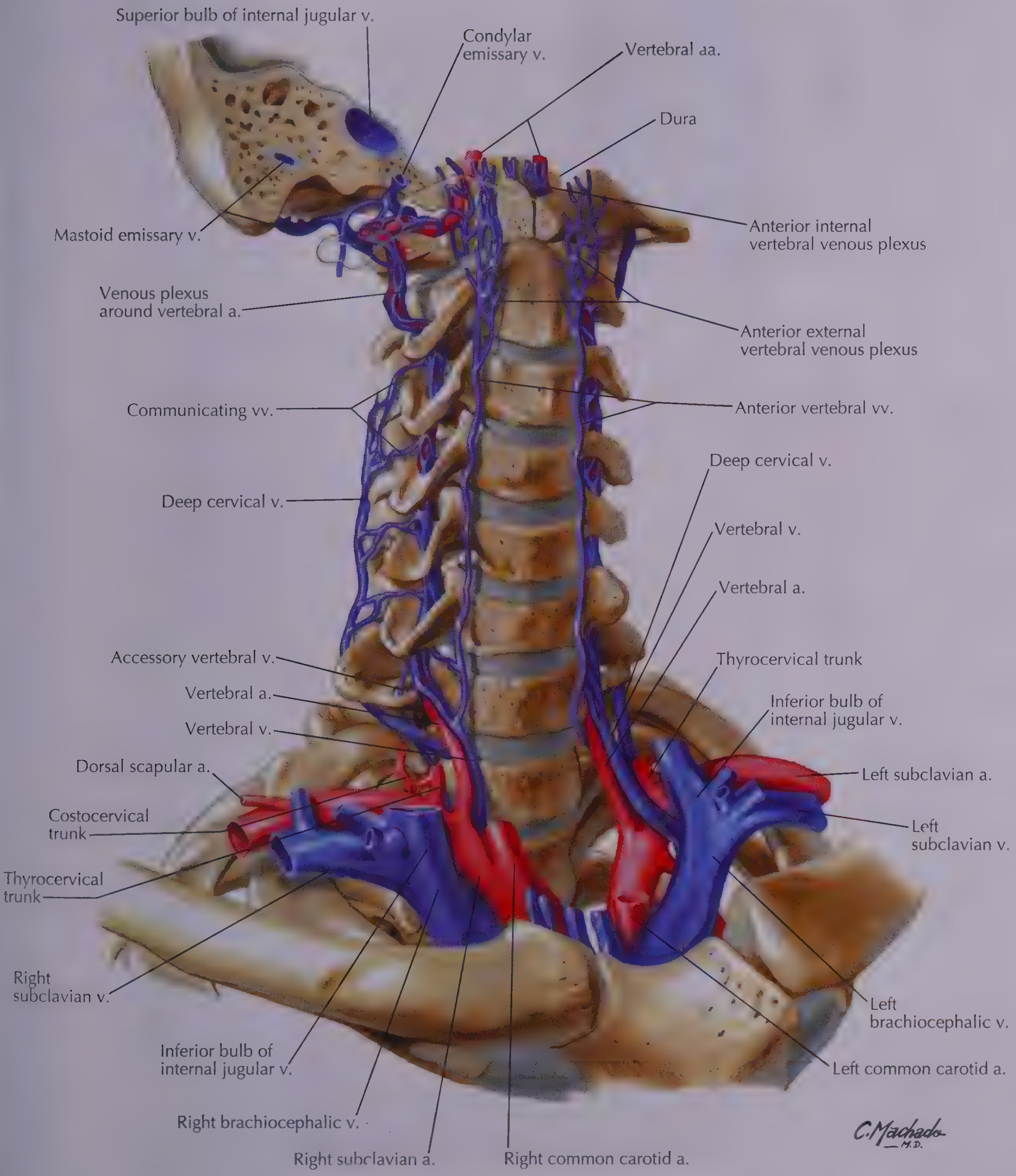
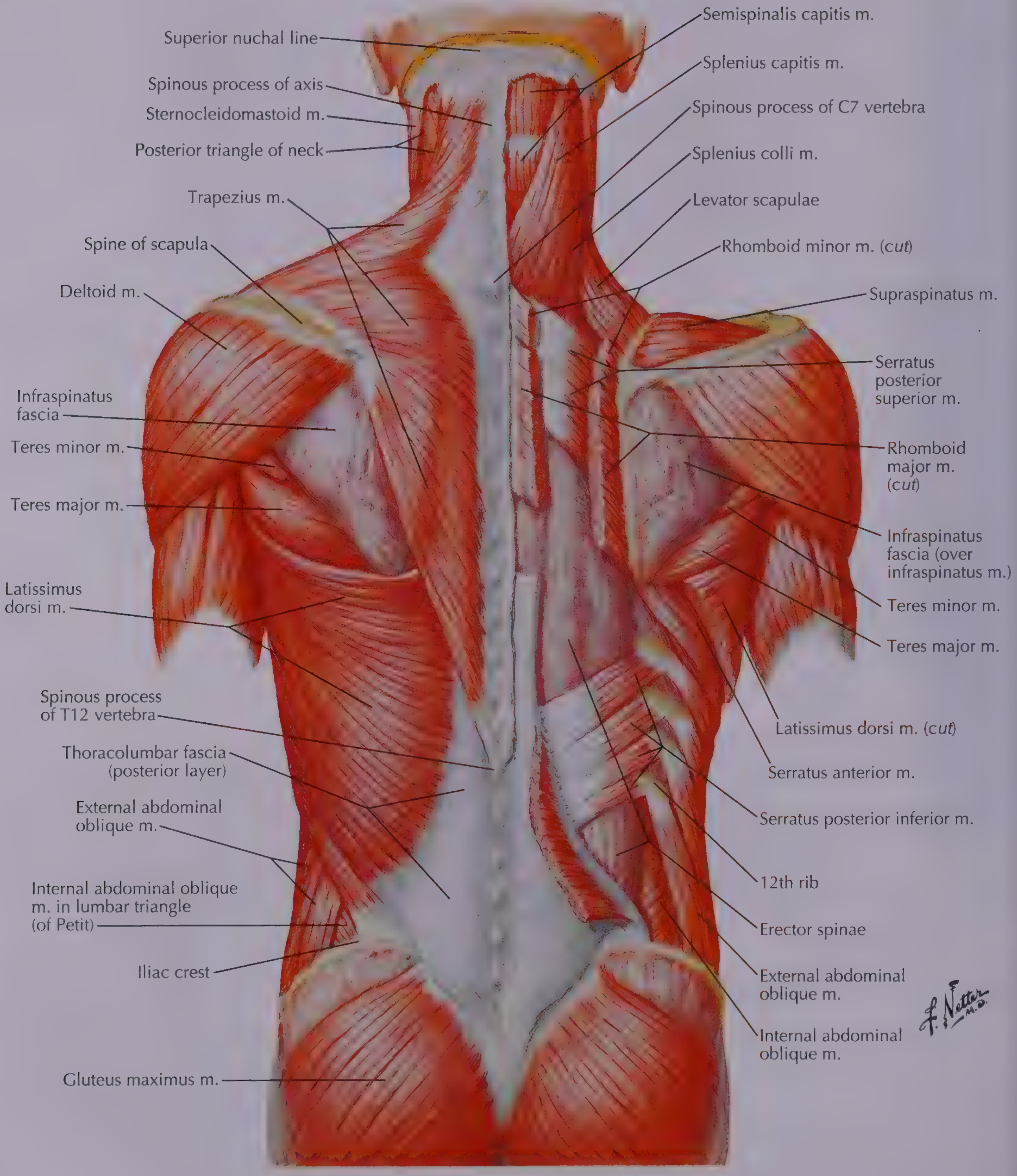
Veins of Vertebral Column: Vertebral Veins

See also Plate BP 39


Superior bulb of internal jugular v.
Condylar emissary v.
Vertebral aa.
Dura
Anterior internal vertebral venous plexus
Mastoid emissary v.
Venous plexus around vertebral a.
Anterior external vertebral venous plexus
Communicating vv.
Anterior vertebral vv.
Deep cervical v.
Deep cervical v.
Vertebral v.
Vertebral a.
Thyrocervical trunk
Accessory vertebral v.
Vertebral a.
Inferior bulb of internal jugular v.
Vertebral v.
Dorsal scapular a.
Left subclavian a.
Costocervical trunk
Left subclavian v.
Thyrocervical trunk
Right subclavian v.
Left brachiocephalic v.
Inferior bulb of internal jugular v.
Left common carotid a.
Right brachiocephalic v.
C.Machado M.D.
Right subclavian a.
Right common carotid a.

Muscles of Back: Superficial Layer

See also Plates 54, 200, 275


Superior nuchal line
Spinous process of axis
Sternocleidomastoid m.
Posterior triangle of neck
Trapezius m.
Spine of scapula
Deltoid m.
Infraspinatus fascia
Teres minor m.
Teres major m.
Latissimus dorsi m.
Spinous process of T12 vertebra
Thoracolumbar fascia (posterior layer)
External abdominal oblique m.
Internal abdominal oblique m. in lumbar triangle (of Petit)
Iliac crest
Gluteus maximus m.
Semispinalis capitis m.
Splenius capitis m.
Spinous process of C7 vertebra
Splenius colli m.
Levator scapulae
Rhomboid minor m. (*cut*)
Supraspinatus m.
Serratus posterior superior m.
Rhomboid major m. (*cut*)
Infraspinatus fascia (over infraspinatus m.)
Teres minor m.
Teres major m.
Latissimus dorsi m. (*cut*)
Serratus anterior m.
Serratus posterior inferior m.
12th rib
Erector spinae
External abdominal oblique m.
Internal abdominal oblique m.
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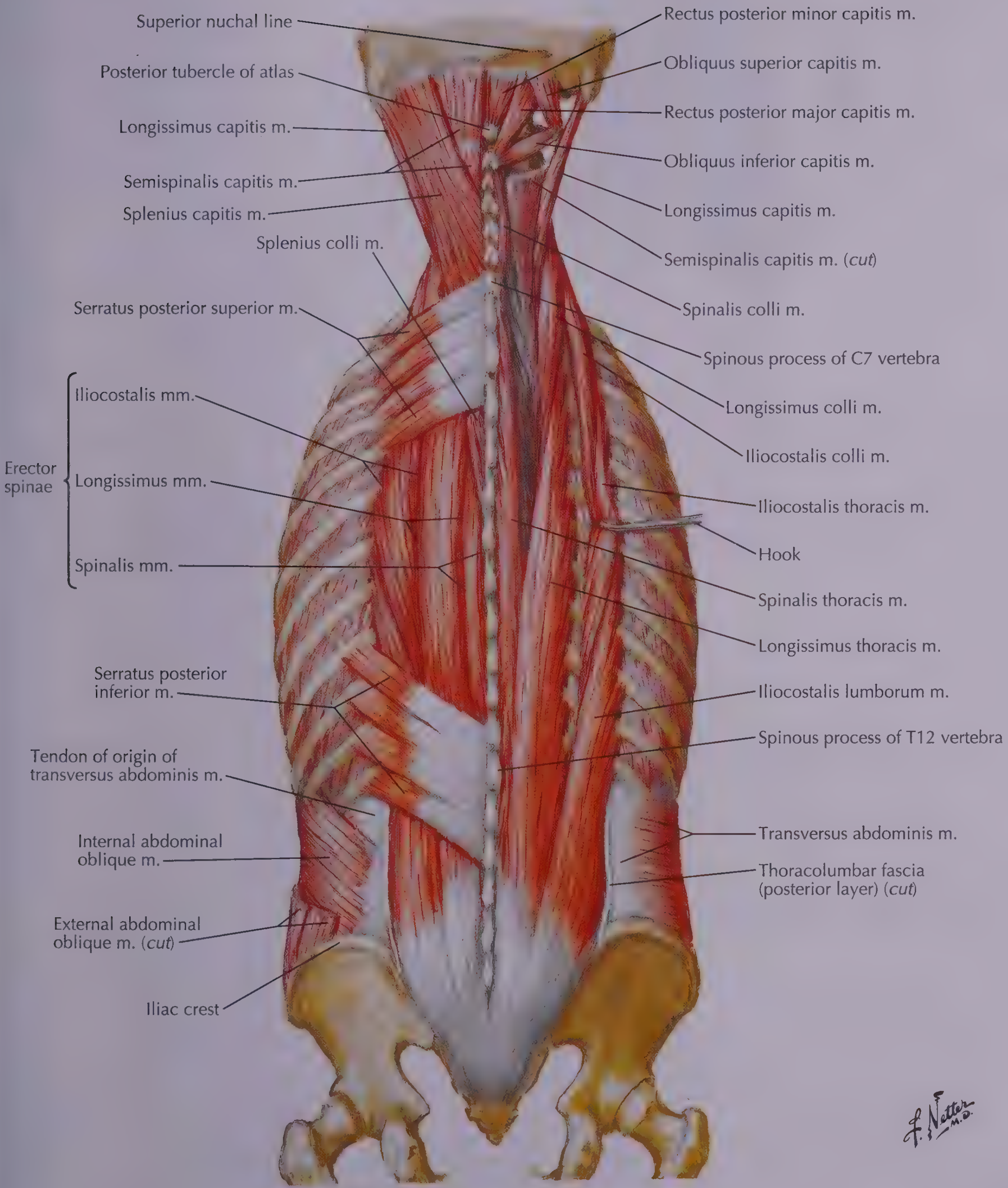
See also Plate 200


Superior nuchal line
Posterior tubercle of atlas
Longissimus capitis m.
Semispinalis capitis m.
Splenius capitis m.
Splenius colli m.
Serratus posterior superior m.
Erector spinae
Iliocostalis mm.
Longissimus mm.
Spinalis mm.
Serratus posterior inferior m.
Tendon of origin of transversus abdominis m.
Internal abdominal oblique m.
External abdominal oblique m. (cut)
Iliac crest
Rectus posterior minor capitis m.
Obliquus superior capitis m.
Rectus posterior major capitis m.
Obliquus inferior capitis m.
Longissimus capitis m.
Semispinalis capitis m. (cut)
Spinalis colli m.
Spinous process of C7 vertebra
Longissimus colli m.
Iliocostalis colli m.
Iliocostalis thoracis m.
Hook
Spinalis thoracis m.
Longissimus thoracis m.
Iliocostalis lumborum m.
Spinous process of T12 vertebra
Transversus abdominis m.
Thoracolumbar fascia (posterior layer) (cut)
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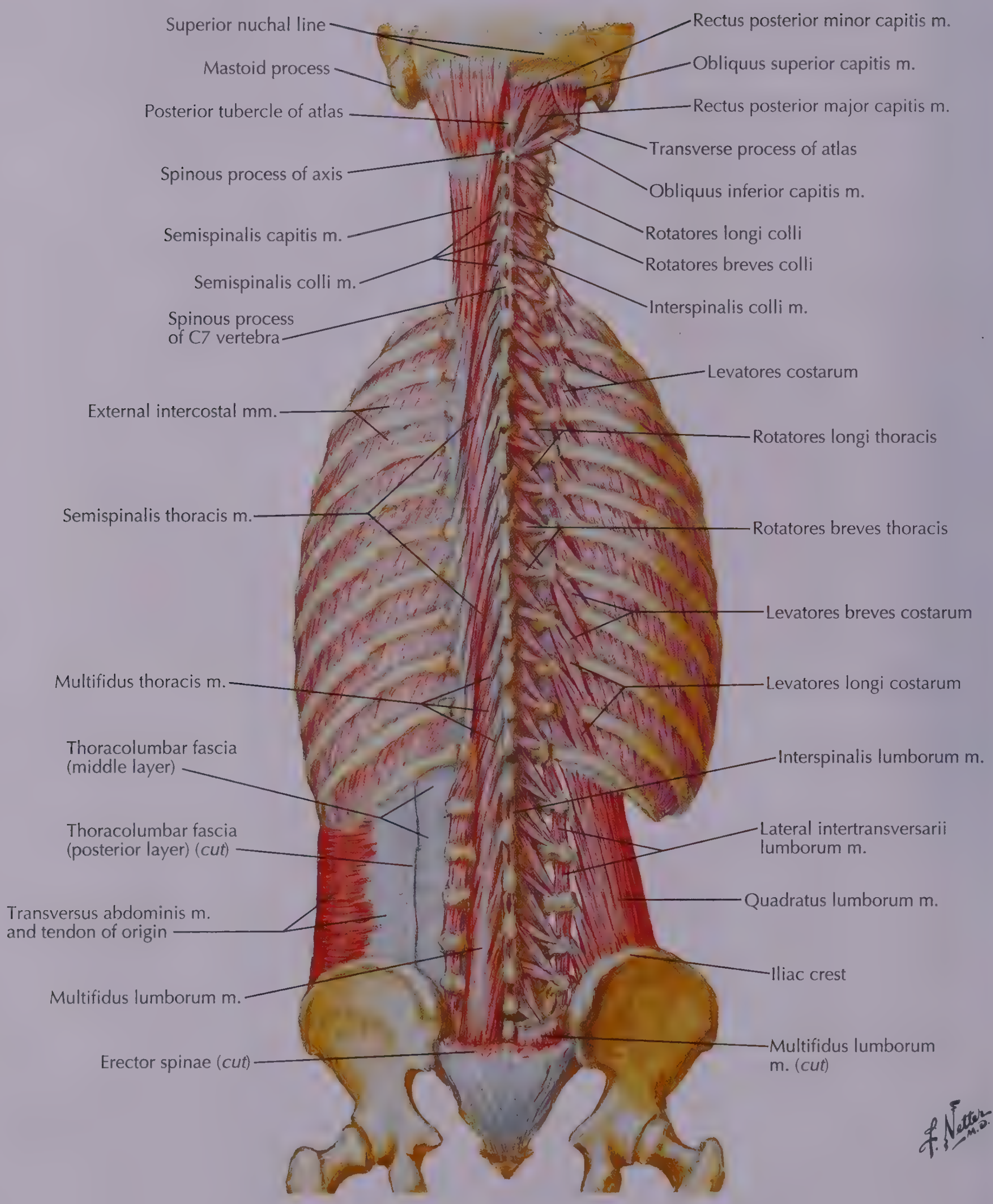
See also Plate 200


Superior nuchal line
Mastoid process
Posterior tubercle of atlas
Spinous process of axis
Semispinalis capitis m.
Semispinalis colli m.
Spinous process of C7 vertebra
External intercostal mm.
Semispinalis thoracis m.
Multifidus thoracis m.
Thoracolumbar fascia (middle layer)
Thoracolumbar fascia (posterior layer) (cut)
Transversus abdominis m. and tendon of origin
Multifidus lumborum m.
Erector spinae (cut)
Rectus posterior minor capitis m.
Obliquus superior capitis m.
Rectus posterior major capitis m.
Transverse process of atlas
Obliquus inferior capitis m.
Rotatores longi colli
Rotatores breves colli
Interspinalis colli m.
Levatores costarum
Rotatores longi thoracis
Rotatores breves thoracis
Levatores breves costarum
Levatores longi costarum
Interspinalis lumborum m.
Lateral intertransversarii lumborum m.
Quadratus lumborum m.
Iliac crest
Multifidus lumborum m. (cut)
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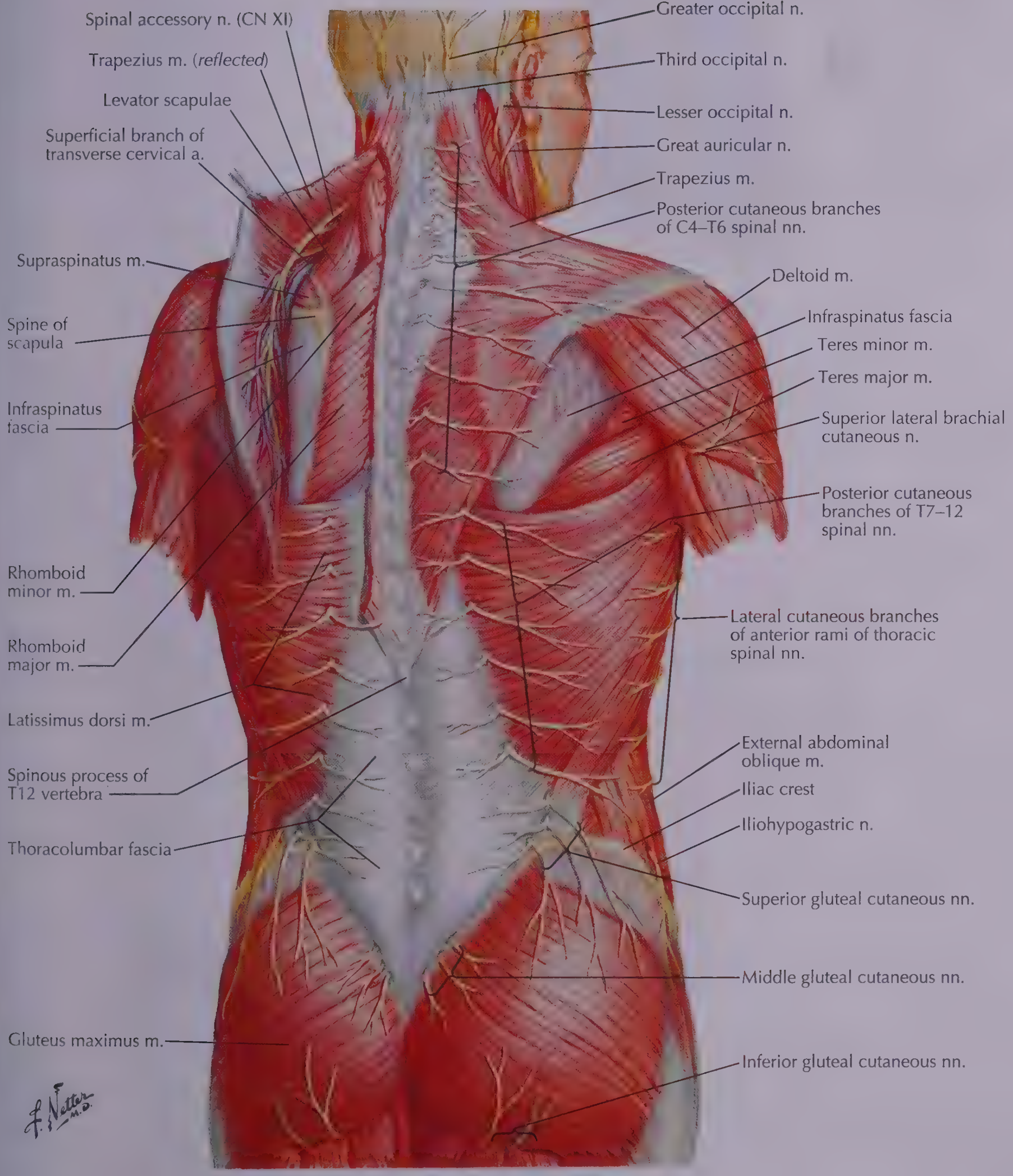
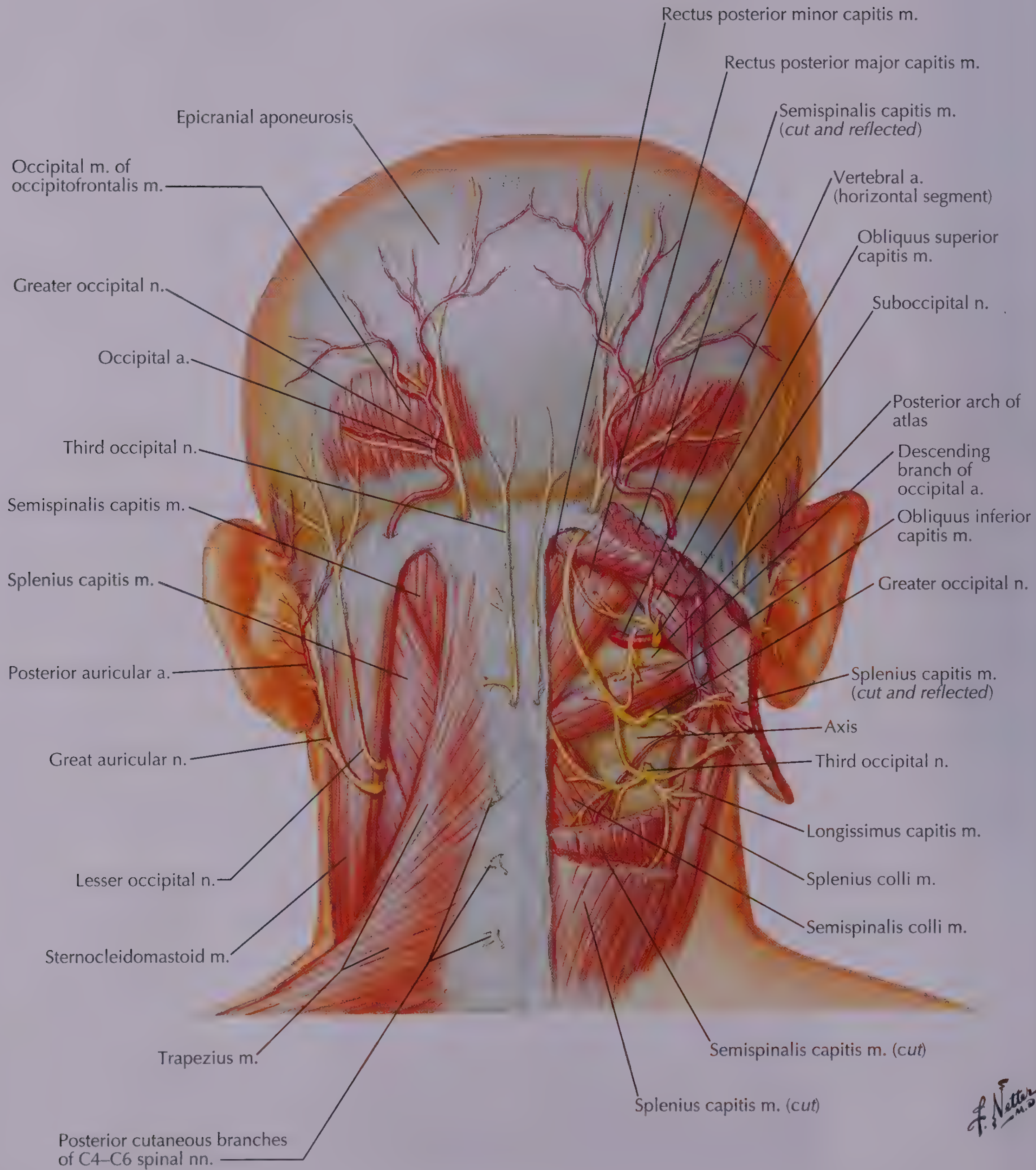
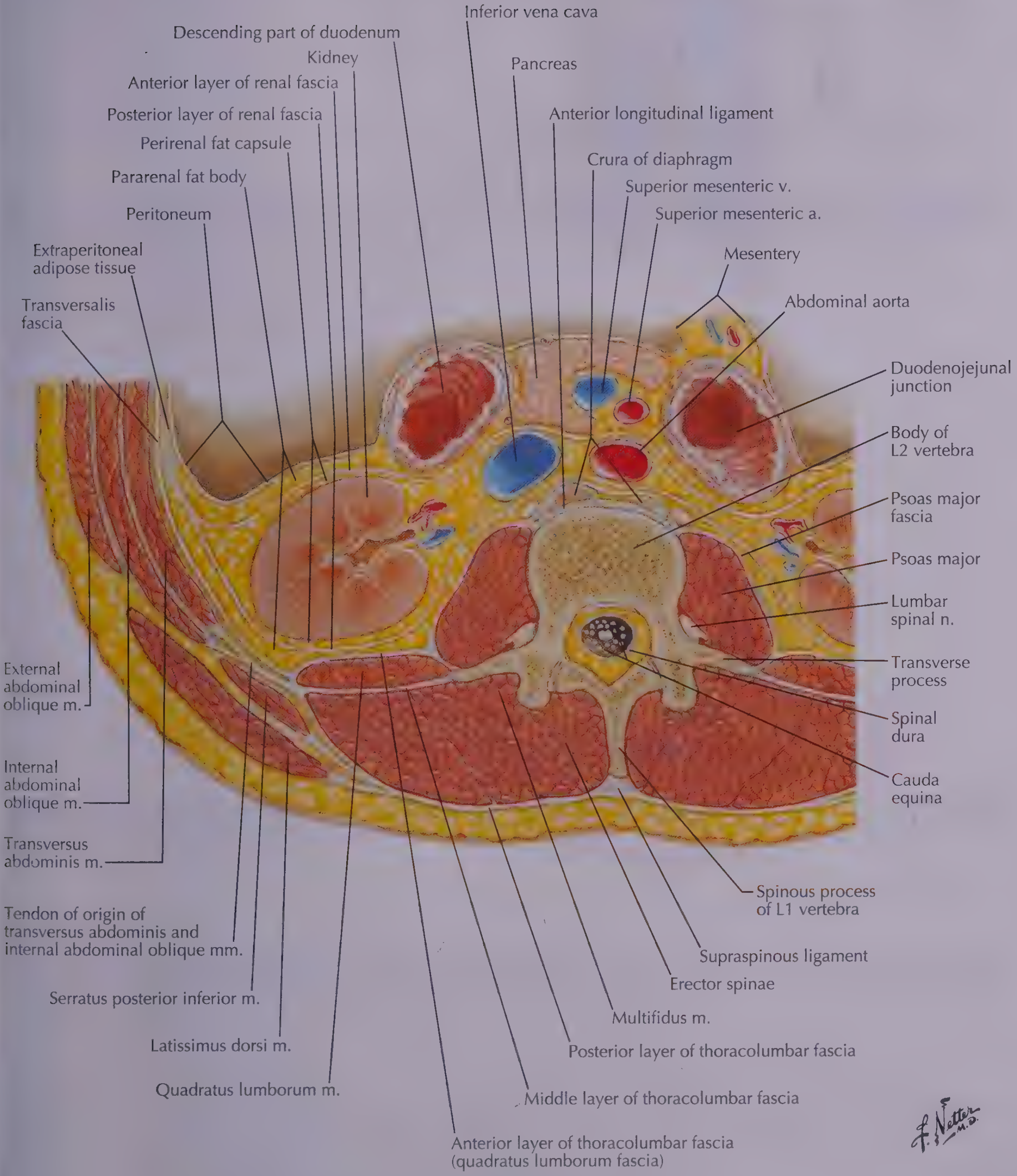

Spinal accessory n. (CN XI)
Trapezius m. (*reflected*)
Levator scapulae
Superficial branch of transverse cervical a.
Supraspinatus m.
Spine of scapula
Infraspinatus fascia
Rhomboid minor m.
Rhomboid major m.
Latissimus dorsi m.
Spinous process of T12 vertebra
Thoracolumbar fascia
Gluteus maximus m.
F. Netter M.D.
Greater occipital n.
Third occipital n.
Lesser occipital n.
Great auricular n.
Trapezius m.
Posterior cutaneous branches of C4–T6 spinal nn.
Deltoid m.
Infraspinatus fascia
Teres minor m.
Teres major m.
Superior lateral brachial cutaneous n.
Posterior cutaneous branches of T7–12 spinal nn.
Lateral cutaneous branches of anterior rami of thoracic spinal nn.
External abdominal oblique m.
Iliac crest
Iliohypogastric n.
Superior gluteal cutaneous nn.
Middle gluteal cutaneous nn.
Inferior gluteal cutaneous nn.

See also Plates 54, 56


Rectus posterior minor capitis m.
Rectus posterior major capitis m.
Semispinalis capitis m. (*cut and reflected*)
Epicranial aponeurosis
Vertebral a. (horizontal segment)
Occipital m. of occipitofrontalis m.
Obliquus superior capitis m.
Suboccipital n.
Greater occipital n.
Occipital a.
Posterior arch of atlas
Third occipital n.
Descending branch of occipital a.
Semispinalis capitis m.
Obliquus inferior capitis m.
Splenius capitis m.
Greater occipital n.
Posterior auricular a.
Splenius capitis m. (*cut and reflected*)
Axis
Great auricular n.
Third occipital n.
Longissimus capitis m.
Lesser occipital n.
Splenius colli m.
Semispinalis colli m.
Sternocleidomastoid m.
Trapezius m.
Semispinalis capitis m. (*cut*)
Splenius capitis m. (*cut*)
Posterior cutaneous branches of C4–C6 spinal nn.

See also Plates 330, 331, 337


Inferior vena cava
Descending part of duodenum
Kidney
Pancreas
Anterior layer of renal fascia
Posterior layer of renal fascia
Anterior longitudinal ligament
Perirenal fat capsule
Crura of diaphragm
Pararenal fat body
Superior mesenteric v.
Superior mesenteric a.
Peritoneum
Mesentery
Extraperitoneal adipose tissue
Abdominal aorta
Transversalis fascia
Duodenojejunal junction
Body of L2 vertebra
Psoas major fascia
Psoas major
Lumbar spinal n.
External abdominal oblique m.
Transverse process
Spinal dura
Internal abdominal oblique m.
Cauda equina
Transversus abdominis m.
Spinous process of L1 vertebra
Tendon of origin of transversus abdominis and internal abdominal oblique mm.
Supraspinous ligament
Erector spinae
Serratus posterior inferior m.
Multifidus m.
Latissimus dorsi m.
Posterior layer of thoracolumbar fascia
Quadratus lumborum m.
Middle layer of thoracolumbar fascia
Anterior layer of thoracolumbar fascia (quadratus lumborum fascia)
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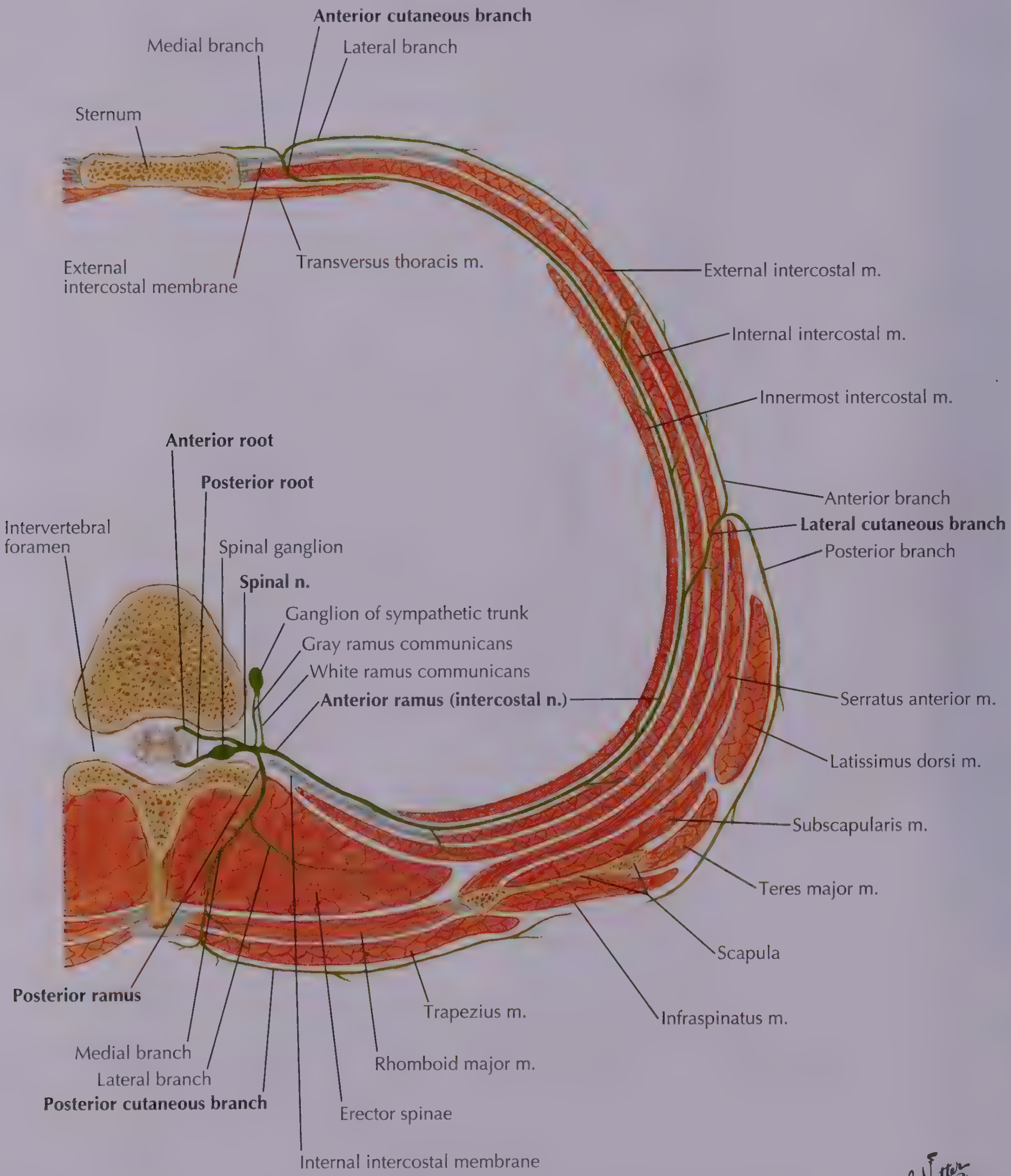
Anterior cutaneous branch
Medial branch
Lateral branch
Sternum
External intercostal membrane
Transversus thoracis m.
External intercostal m.
Internal intercostal m.
Innermost intercostal m.
Anterior root
Posterior root
Intervertebral foramen
Spinal ganglion
Spinal n.
Ganglion of sympathetic trunk
Gray ramus communicans
White ramus communicans
Anterior ramus (intercostal n.)
Anterior branch
Lateral cutaneous branch
Posterior branch
Serratus anterior m.
Latissimus dorsi m.
Subscapularis m.
Teres major m.
Scapula
Infraspinatus m.
Trapezius m.
Rhomboid major m.
Erector spinae
Internal intercostal membrane
Posterior ramus
Medial branch
Lateral branch
Posterior cutaneous branch

Note: In lower thoracic region, lateral branch of posterior ramus is longer, and motor and cutaneous; medial branch is shorter and motor only.

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ANATOMICAL STRUCTURE	CLINICAL COMMENT	PLATE NUMBERS
Nervous System and Sense Organs		
Conus medullaris	Is inferior limit of spinal cord; can lie as inferior as L4 vertebra in neonates and as superior as T12 in adults (average is L1–L2); necessary to determine its location in procedures such as lumbar puncture; in adults, start at L2 or lower	186
Cauda equina	Lumbar and sacral nerve roots may be anesthetized with anesthesia injected into subarachnoid space (spinal block)	186, 187
Spinal meninges	Access to epidural and subarachnoid spaces is necessary for clinical procedures such as epidural anesthesia and lumbar puncture; meningitis is a life-threatening infection	182, 190
Skeletal System		
Spinous processes	Palpable landmarks used to assess spinal curvatures and determine location of spinal cord for procedures such as lumbar puncture and injection of spinal anesthesia	178, 195
Spinous process of C7 vertebra (vertebra prominens)	Most prominent spinous process in cervical region; often used to begin counting vertebrae	178, 180
Intervertebral disc	Age-related changes may produce herniation of nucleus pulposus, causing back pain; occurs most commonly in lower lumbar regions of vertebral column	181, 187
Lamina of vertebral arch	Surgically removed in laminectomy to gain access to vertebral canal and spinal cord	181
Intervertebral foramen	May become narrowed by age-related changes (e.g., osteophyte formation) or changes in intervertebral disc height, producing compression of its contents	181, 184, 185
Sacral hiatus	Provides access to epidural space for administration of caudal epidural anesthesia	183
Fifth lumbar vertebra	Spondylolysis is clinical condition in which vertebral body separates from part of its vertebral arch bearing inferior articulating process (defect is through pars interarticularis); if this occurs bilaterally, L5 vertebral body and transverse process may slide forward over sacrum, giving rise to spondylolisthesis	184
L5–S1 intervertebral disc	Most common level of intervertebral disc herniation, which may result in nerve compression and lower back pain associated with pain and weakness in ipsilateral lower limb (sciatica)	184, 187
Vertebral foramen	May be congenitally stenotic in cervical region, or narrowed by arthritic changes in lumbar vertebrae; can lead to back pain, sciatica, numbness or tingling, and weakness in lower limbs	180, 181
Muscular System		
Trapezius muscle	Responsible for holding scapula against thoracic wall against gravity; drooping of shoulder may indicate injury to spinal accessory nerve	195
Deep (or intrinsic) back muscles	Microscopic stretching or tearing of muscle fibers produces back strain, a common cause of low back pain	196, 197
Cardiovascular System		
Arteries of spinal cord	Narrowing or damage caused by atherosclerosis, vertebral fractures, or vertebral dislocations may cause ischemia of spinal cord	191
Vertebral venous plexuses	Mostly valveless veins along vertebral column allow retrograde flow and can act as conduits for metastasis of cancer cells to spine, lungs, and brain	194, BP 39

*Selections were based largely on clinical data and commonly discussed clinical correlations in macroscopic ("gross") anatomy courses.

MUSCLE	MUSCLE GROUP	SUPERIOR ATTACHMENT	INFERIOR ATTACHMENT	INNERVATION	BLOOD SUPPLY	MAIN ACTIONS
Iliocostalis mm.	Deep back (erector spinae)	*Colli muscle:* posterior tubercles of C4–C6 vertebrae	*Colli muscle:* angles of ribs 3–6	Posterior rami of spinal nerves	*Cervical portions:* occipital, deep cervical, and vertebral arteries	Extend and laterally bend vertebral column and head
		Thoracis muscle: angles of ribs 1–6	*Thoracis muscle:* angles of ribs 7–12		*Thoracic portions:* dorsal branches of posterior intercostal and subcostal arteries	
		Lumborum muscle: ribs 4–12, transverse processes of L1–L4 vertebrae	*Lumborum muscle:* sacrum (via erector spinae aponeurosis), iliac crest		*Lumbar portions:* dorsal branches of lumbar and lateral sacral arteries	
Interspinalis mm.	Deep back	*Colli muscle:* spinous processes of C2–C7 vertebrae	Spinous processes of vertebrae subjacent to vertebrae of muscle origin	Posterior rami of spinal nerves	*Cervical portions:* occipital, deep cervical, and vertebral arteries	Aid in extension of vertebral column
		Thoracis muscle: spinous processes of T1–T2 and T11–T12 vertebrae			*Thoracic portions:* dorsal branches of posterior intercostal and subcostal arteries	
		Lumborum muscle: spinous processes of L1–L4 vertebrae			*Lumbar portions:* dorsal branches of lumbar arteries	
Intertransversarii mm.	Deep back	*Medial muscles:* transverse processes of C1–C7 and T10–T12 vertebrae, mammillary processes of L1–L4 vertebrae	*Medial muscles:* transverse processes of subjacent cervical and thoracic vertebrae, mammillary processes of subjacent lumbar vertebrae	*Medial muscles:* posterior rami of spinal nerves	*Cervical portions:* occipital, deep cervical, and vertebral arteries	Assist in lateral flexion of vertebral column
					Thoracic portions: dorsal branches of posterior intercostal and subcostal arteries	
		Lateral and anterior muscles: transverse processes of C1–C7 and L1–L4 vertebrae	*Lateral and anterior muscles:* transverse processes of subjacent vertebrae	*Lateral and anterior muscles:* anterior rami of spinal nerves	*Lumbar portions:* dorsal branches of lumbar arteries	
Latissimus dorsi m.	Superficial back	Spinous processes of T7–T12 vertebrae, posterior layer of thoracolumbar fascia (and thus to L1–L5 vertebrae and iliac crest), ribs 10–12	Intertubercular sulcus of humerus	Thoracodorsal nerve	Thoracodorsal artery, dorsal perforating branches of 9th, 10th, and 11th posterior intercostal, subcostal, and first three lumbar arteries	Extends, adducts, and medially rotates humerus
Levator scapulae	Superficial back	Transverse processes of atlas and axis, posterior tubercles of transverse processes of C3–C4 vertebrae	Medial border of scapula (superior to spine)	Anterior rami of C3–C4 spinal nerves, dorsal scapular nerve	Dorsal scapular and transverse and ascending cervical arteries	Elevates scapula medially, inferiorly rotates glenoid fossa
Longissimus mm.	Deep back (erector spinae)	*Capitis muscle:* mastoid process	*Capitis muscle:* transverse processes of C4–T4 vertebrae	Posterior rami of spinal nerves	*Cervical portions:* occipital, deep cervical, and vertebral arteries	Extend and laterally bend vertebral column and head
		Colli muscle: transverse processes of C2–C6 vertebrae	*Colli muscle:* transverse processes of T1–T5 vertebrae		*Thoracic portions:* dorsal branches of posterior intercostal and subcostal arteries	
		Thoracis muscle: transverse processes of T1–T12 vertebrae, ribs 5–12, accessory and transverse processes of L1–L5 vertebrae	*Thoracis muscle:* spinous processes of L1–L5 vertebrae, posterior surface of sacrum, iliac tuberosity, posterior sacroiliac ligament		*Lumbar portions:* dorsal branches of lumbar and lateral sacral arteries	

MUSCLE	MUSCLE GROUP	SUPERIOR ATTACHMENT	INFERIOR ATTACHMENT	INNERVATION	BLOOD SUPPLY	MAIN ACTIONS
Multifidus mm.	Deep back (transversospinales)	Spinous processes of C2–L5 vertebrae (2–5 levels above muscle insertion)	*Colli muscle:* superior articular processes of C4–C7 vertebrae	Posterior rami of spinal nerves	*Cervical portions:* occipital, deep cervical, and vertebral arteries	Stabilize spine
			Thoracis muscle: transverse processes of T1–T12 vertebrae		*Thoracic portions:* dorsal branches of posterior intercostal and subcostal arteries	
			Lumborum muscle: mammillary processes of L1–L5 vertebrae, sacrum, iliac crest		*Lumbar portions:* dorsal branches of lumbar and lateral sacral arteries	
Obliquus inferior capitis m.	Suboccipital	Transverse process of atlas	Spinous process of axis	Suboccipital nerve	Vertebral artery and occipital arteries	Rotates atlas to turn face to same side
Obliquus superior capitis m.	Suboccipital	Lateral part of inferior nuchal line	Transverse process of atlas	Suboccipital nerve	Vertebral and occipital arteries	Extends and bends head laterally
Rectus posterior major capitis m.	Suboccipital	Middle part of inferior nuchal line	Spinous process of axis	Suboccipital nerve	Vertebral and occipital arteries	Extends and rotates head to same side
Rectus posterior minor capitis m.	Suboccipital	Medial part of inferior nuchal line	Posterior tubercle of atlas	Suboccipital nerve	Vertebral and occipital arteries	Extends head
Rhomboid major m.	Superficial back	Spinous processes of T2–T5 vertebrae	Medial border of scapula (inferior to spine of scapula)	Dorsal scapular nerve	Dorsal scapular artery *OR* deep branch of transverse cervical artery, dorsal perforating branches of upper five or six posterior intercostal arteries	Fixes scapula to thoracic wall and retracts and rotates it to depress glenoid fossa
Rhomboid minor m.	Superficial back	Nuchal ligament, spinous processes of C7 and T1 vertebrae	Medial border of scapula (at spine of scapula)	Dorsal scapular nerve	Dorsal scapular artery *OR* deep branch of transverse cervical artery, dorsal perforating branches of upper five or six posterior intercostal arteries	Fixes scapula to thoracic wall and retracts and rotates it to depress glenoid fossa
Rotatores	Deep back (transversospinales)	*Colli muscle:* spinous processes of cervical vertebrae	*Colli muscle:* superior articular processes of cervical vertebrae 1 or 2 levels below vertebra of muscle origin	Posterior rami of spinal nerves	*Cervical portions:* occipital, deep cervical, and vertebral arteries	Stabilize, extend, and rotate spine
		Thoracis muscle: spinous processes and laminae of T1–T11 vertebrae	*Thoracis muscle:* transverse processes of T2–T12 vertebrae (brevis muscles insert into adjacent vertebra; longus muscles into vertebra 2 levels down)		*Thoracic portions:* dorsal branches of posterior intercostal and subcostal arteries	
		Lumborum muscle: spinous processes of lumbar vertebrae	*Lumborum muscle:* mammillary processes of lumbar vertebrae 2 levels down		*Lumbar portions:* dorsal branches of lumbar arteries	

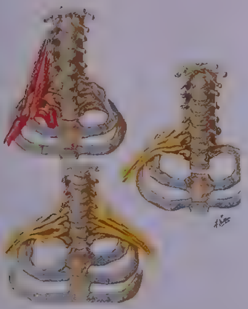
MUSCLE	MUSCLE GROUP	SUPERIOR ATTACHMENT	INFERIOR ATTACHMENT	INNERVATION	BLOOD SUPPLY	MAIN ACTIONS
Semispinalis mm.	Deep back (transversospinales)	*Capitis muscle:* occipital bone (between superior and inferior nuchal lines)	*Capitis muscle:* superior articular processes of C4–C7 vertebrae, transverse processes of T1–T6 vertebrae	Posterior rami of spinal nerves	*Cervical portions:* occipital, deep cervical, and vertebral arteries	Extend head and neck and rotate them to opposite side
		Colli muscle: spinous processes of C2–C5 vertebrae	*Colli muscle:* transverse processes of T1–T6 vertebrae			
		Thoracis muscle: spinous processes of C6–T4 vertebrae	*Thoracis muscle:* transverse processes of T6–T10 vertebrae		*Thoracic portions:* dorsal branches of posterior intercostal arteries	
Serratus posterior inferior m.	Superficial back	Inferior aspect of ribs 9–12	Spinous processes of T11–L2 vertebrae	Anterior rami of T9–T12 spinal nerves	Posterior intercostal arteries	Depresses ribs
Serratus posterior superior m.	Superficial back	Nuchal ligament, spinous processes of C7–T3 vertebrae	Superior aspect of ribs 2–5	Anterior rami of T2–T5 spinal nerves	Posterior intercostal arteries	Elevates ribs
Spinalis mm.	Deep back (erector spinae)	*Capitis muscle:* external occipital protuberance	*Capitis muscle:* spinous processes of C7 and T1 vertebrae	Posterior rami of spinal nerves	*Cervical portions:* occipital, deep cervical, and vertebral arteries	Extend and laterally bend vertebral column and head
		Colli muscle: spinous processes of C2–C4 vertebrae	*Colli muscle:* spinous processes of C7–T2 vertebrae		*Thoracic portions:* dorsal branches of posterior intercostal and subcostal arteries	
		Thoracis muscle: spinous processes of T2–T8 vertebrae	*Thoracis muscle:* spinous processes of T11–L2 vertebrae		*Lumbar portions:* dorsal branches of lumbar and lateral sacral arteries	
Splenius capitis m.	Spinotransversales	Mastoid process of temporal bone, lateral one-third of superior nuchal line	Nuchal ligament, spinous processes of C7–T4 vertebrae	Posterior rami of C2–C3 spinal nerves	Occipital artery and deep cervical arteries	*Bilaterally:* extends head *Unilaterally:* laterally bends (flexes) and rotates face to same side
Splenius colli m.	Spinotransversales	Transverse processes of C1–C3 vertebrae	Spinous processes of T3–T6 vertebrae	Posterior rami of C4–C6 spinal nerves	Occipital and deep cervical arteries	*Bilaterally:* extends neck *Unilaterally:* laterally bends (flexes) and rotates neck toward same side
Trapezius m.	Superficial back	*Descending part:* superior nuchal line, external occipital protuberance, nuchal ligament	*Descending part:* lateral one-third of clavicle	Spinal accessory nerve (CN XI)	Transverse cervical and posterior intercostal arteries	Elevates, retracts, and rotates scapula; lower fibers depress scapula
		Transverse part: spinous processes of C7–T3 vertebrae	*Transverse part:* acromion			
		Ascending part: spinous processes of T4–T12 vertebrae	*Ascending part:* spine of scapula			

Variations in spinal nerve contributions to the innervation of muscles, their arterial supply, their attachments, and their actions are common themes in human anatomy. Therefore, expect differences between texts and realize that anatomical variation is normal.

THORAX 4

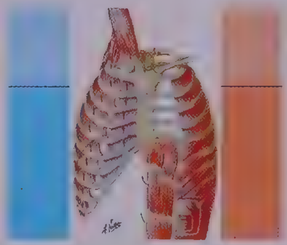
Surface Anatomy 202
Thoracic Skeleton 203–204
Mammary Glands 205–208
Thoracic Wall and Diaphragm 209–216
Lungs, Trachea, and Bronchi 217–230
Heart 231–250
Mediastinum 251–261
Cross-Sectional Anatomy 262–266
Structures with High Clinical Significance Tables 4.1–4.3
Muscles Table 4.4
Electronic Bonus Plates BP 41–BP 52

ELECTRONIC BONUS PLATES



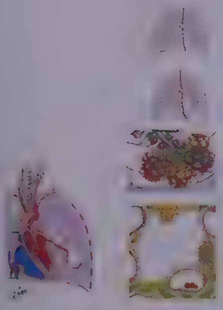
BP 41 Cervical Ribs and Related Variations

BP 42 Muscle Attachments of Ribs

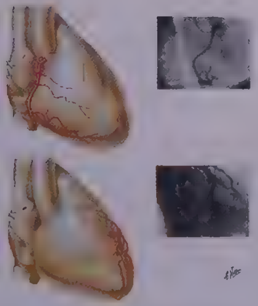


BP 43 Muscles of Respiration

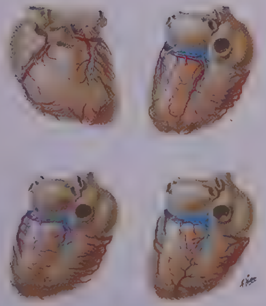
BP 44 Intrapulmonary Airways: Schema



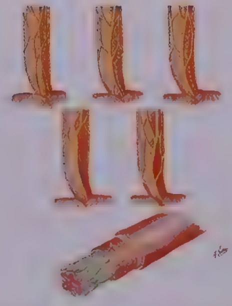
BP 45 Anatomy of Ventilation and Respiration



BP 46 Coronary Arteries: Right Anterolateral Views with Arteriograms

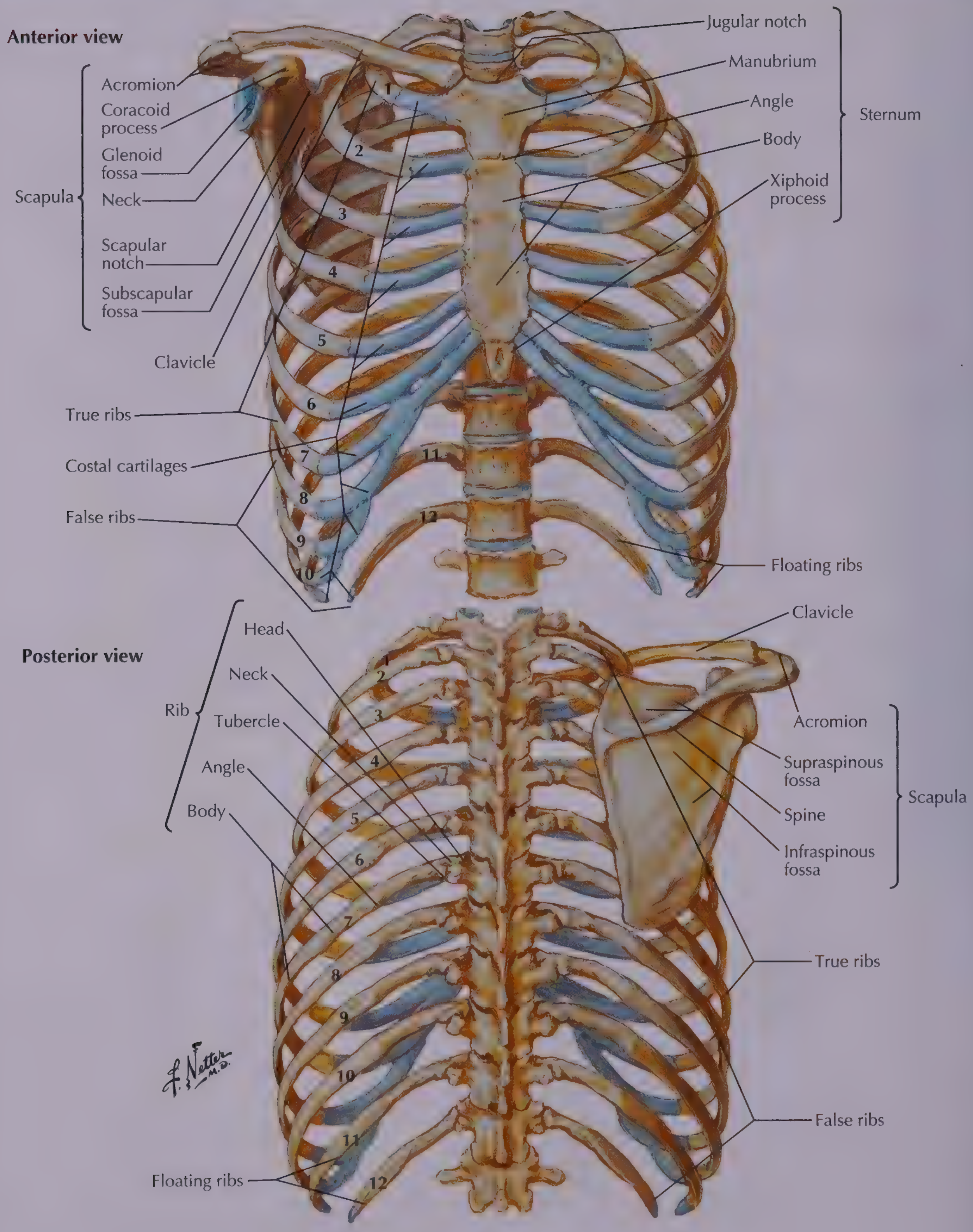


BP 47 Coronary Arteries and Cardiac Veins: Variations



BP 48 Intrinsic Nerves and Variations in Nerves of Esophagus

Bony Framework of Thorax


Anterior view
Acromion
Coracoid process
Glenoid fossa
Scapula
Neck
Scapular notch
Subscapular fossa
Clavicle
True ribs
Costal cartilages
False ribs
Jugular notch
Manubrium
Angle
Body
Xiphoid process
Sternum
Floating ribs
1
2
3
4
5
6
7
8
9
10
11
12
Posterior view
Head
Neck
Tubercle
Angle
Body
Rib
Clavicle
Acromion
Supraspinous fossa
Spine
Infraspinous fossa
Scapula
True ribs
False ribs
Floating ribs
1
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11
12
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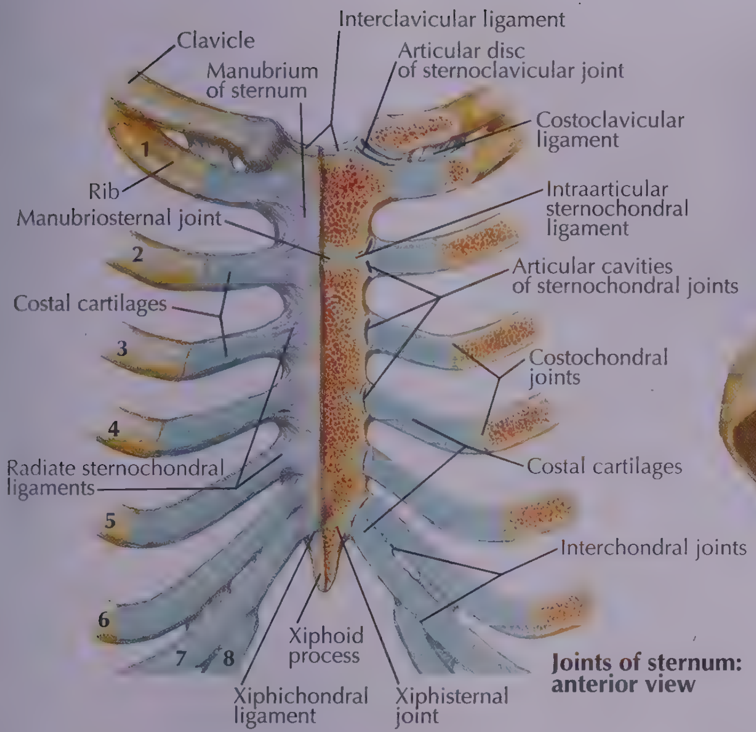
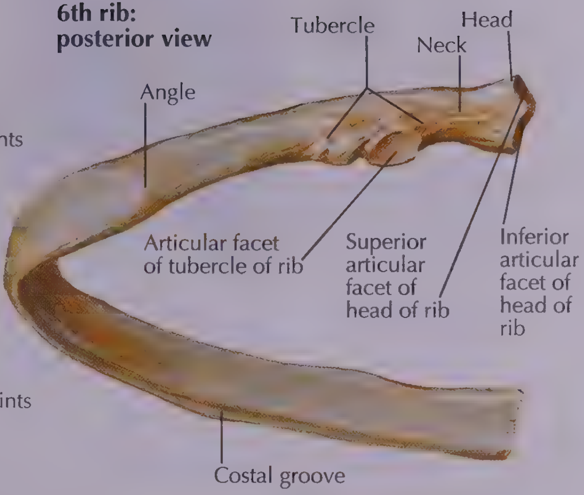
See also Plates 188, 209, BP 33


Interclavicular ligament
Clavicle
Manubrium of sternum
Articular disc of sternoclavicular joint
Costoclavicular ligament
1
Rib
Manubriosternal joint
Intraarticular sternochondral ligament
2
Articular cavities of sternochondral joints
Costal cartilages
3
Costochondral joints
4
Radiate sternochondral ligaments
Costal cartilages
5
Interchondral joints
6
7
8
Xiphoid process
Xiphichondral ligament
Xiphisternal joint

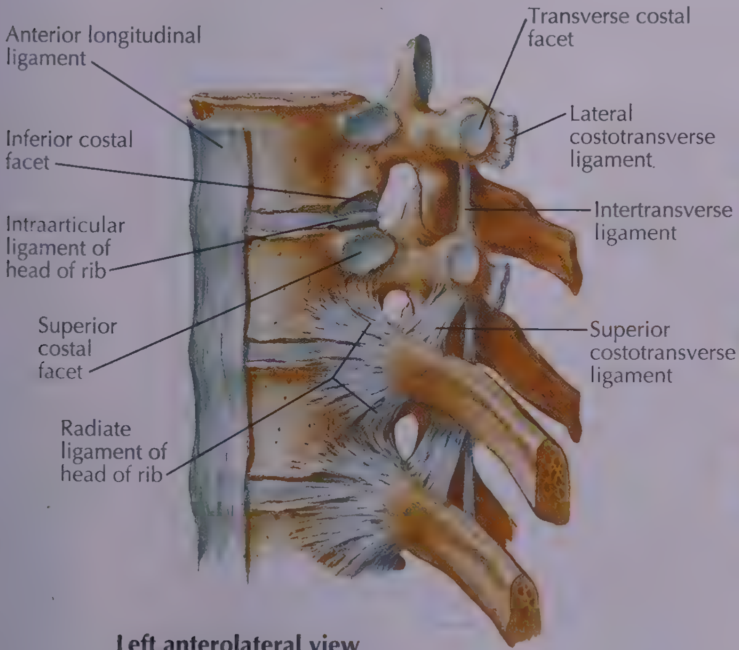
Joints of sternum: anterior view


6th rib: posterior view

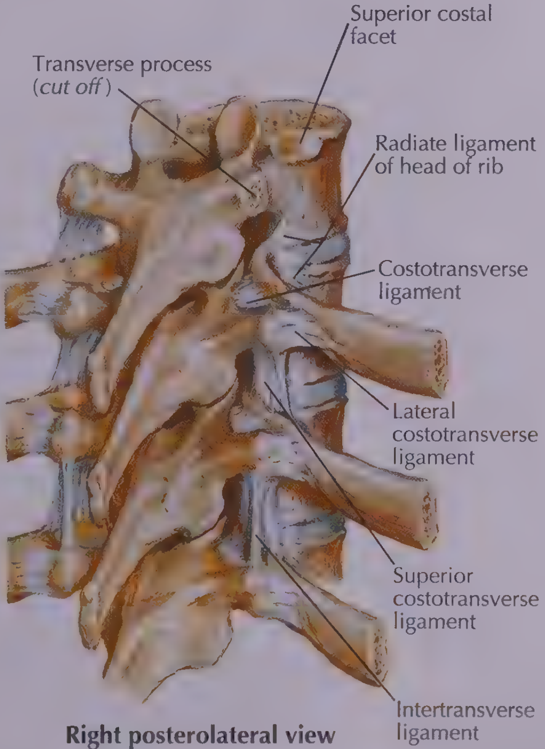
Tubercle
Head
Neck
Angle
Articular facet of tubercle of rib
Superior articular facet of head of rib
Inferior articular facet of head of rib
Costal groove

F. Netter M.D.

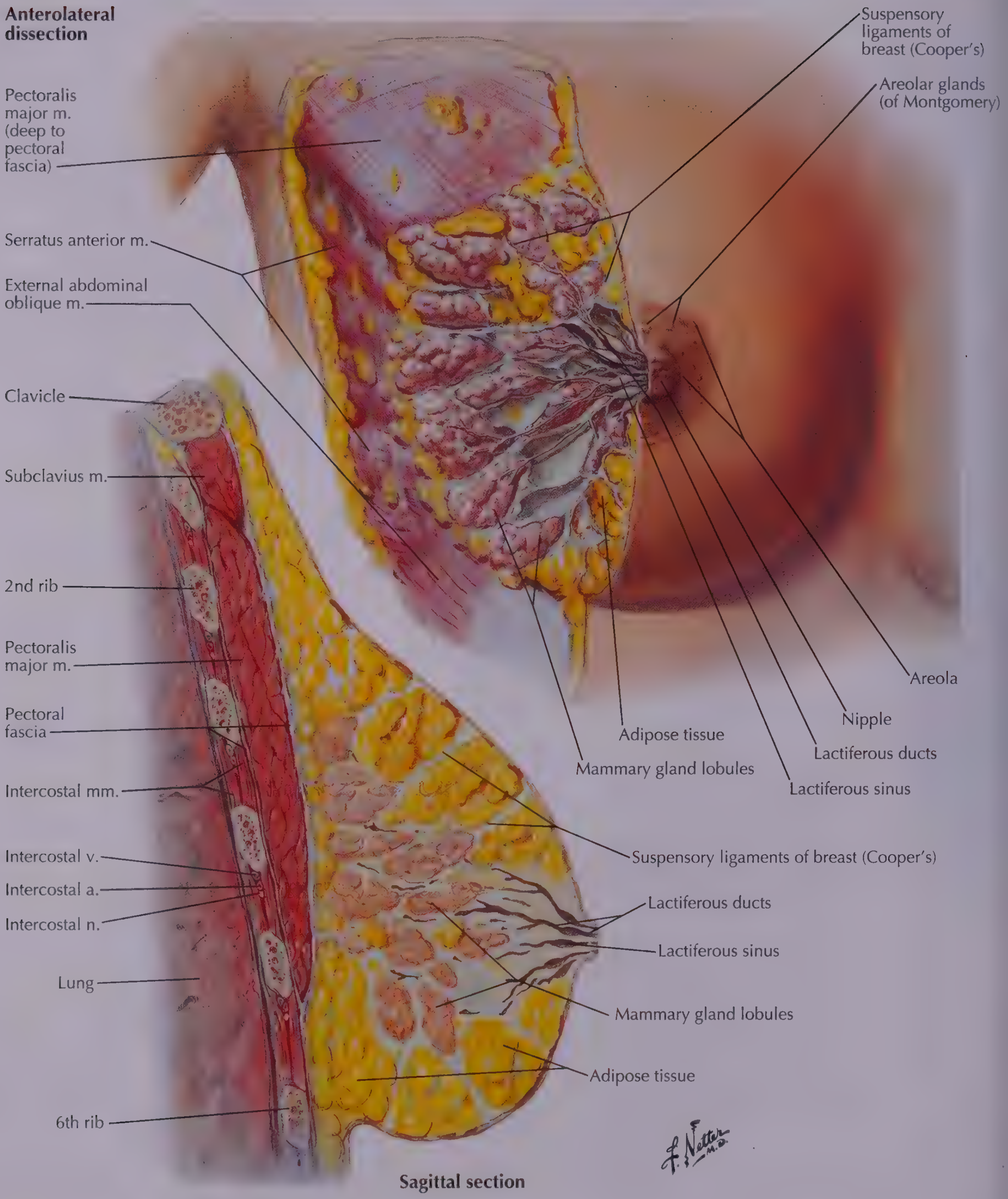
Note: The head of a typical rib articulates with the superior costal facet of the thoracic vertebra of the same number (by its inferior articular facet), the inferior costal facet of the vertebra above (by its superior articular facet), and the intervertebral disc between the two vertebrae. The costal tubercle articulates with the transverse process of the vertebra of the same number.

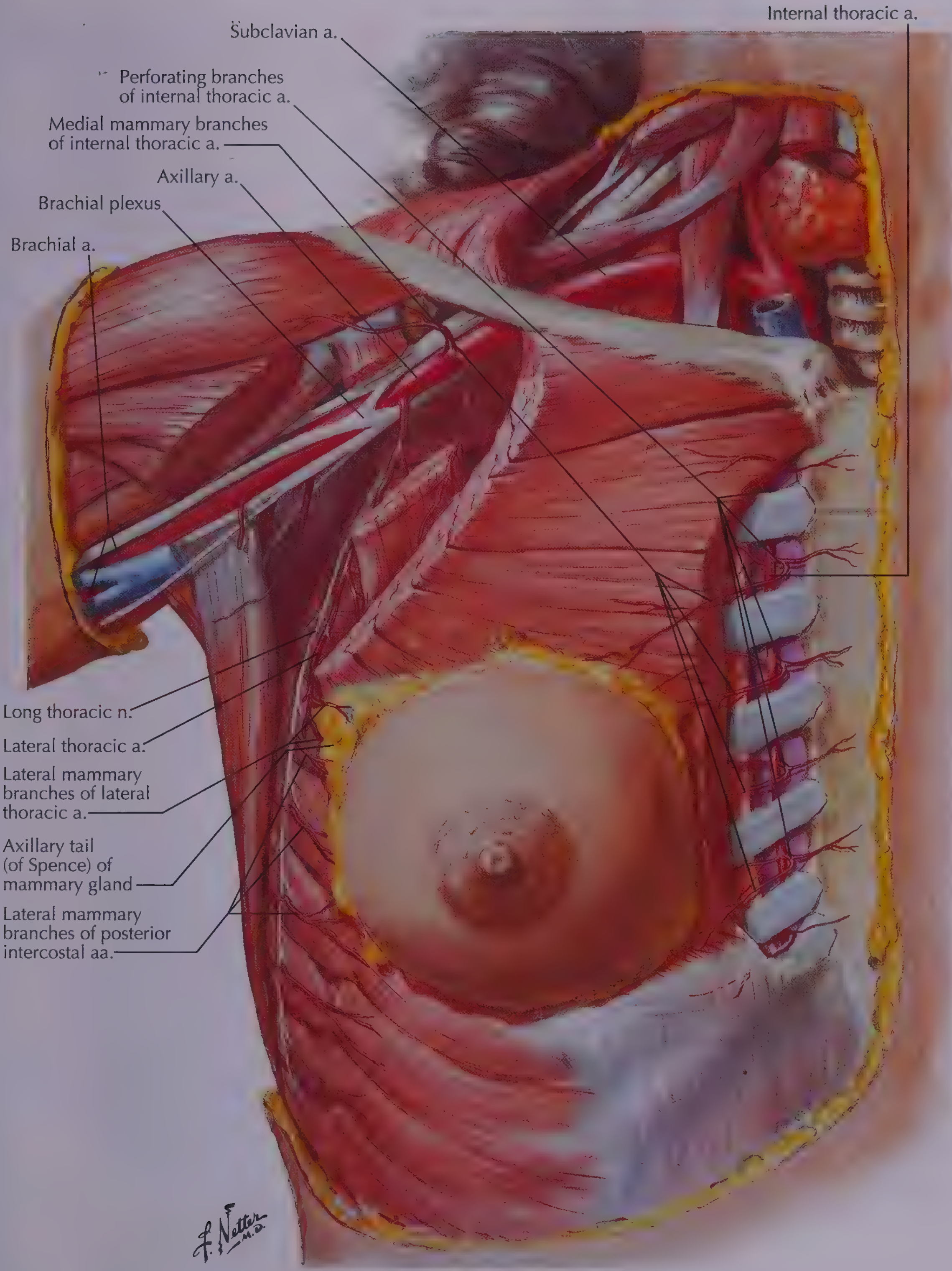

Anterior longitudinal ligament
Transverse costal facet
Lateral costotransverse ligament
Inferior costal facet
Intraarticular ligament of head of rib
Intertransverse ligament
Superior costal facet
Superior costotransverse ligament
Radiate ligament of head of rib

Left anterolateral view

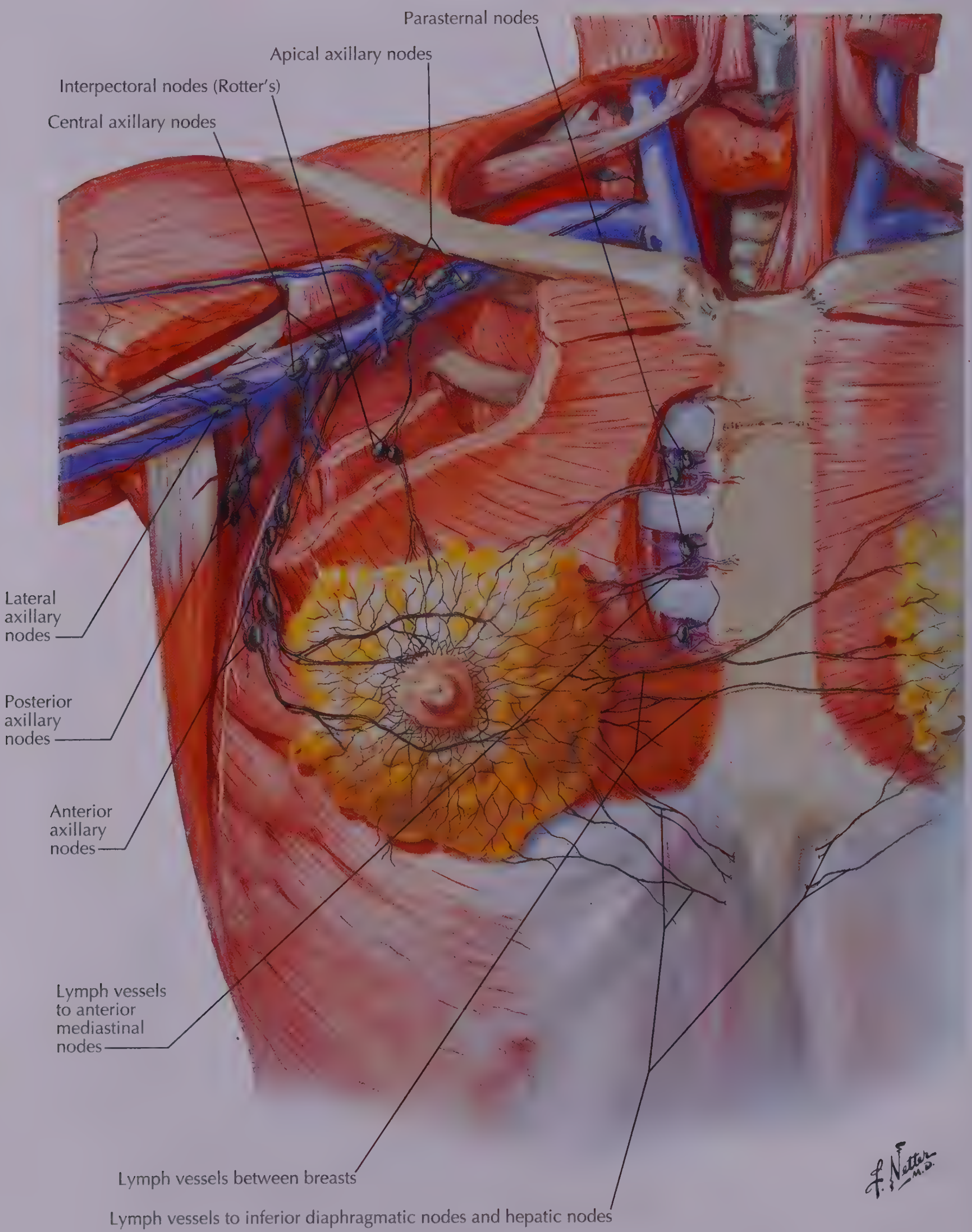

Superior costal facet
Transverse process (cut off)
Radiate ligament of head of rib
Costotransverse ligament
Lateral costotransverse ligament
Superior costotransverse ligament
Intertransverse ligament

Right posterolateral view

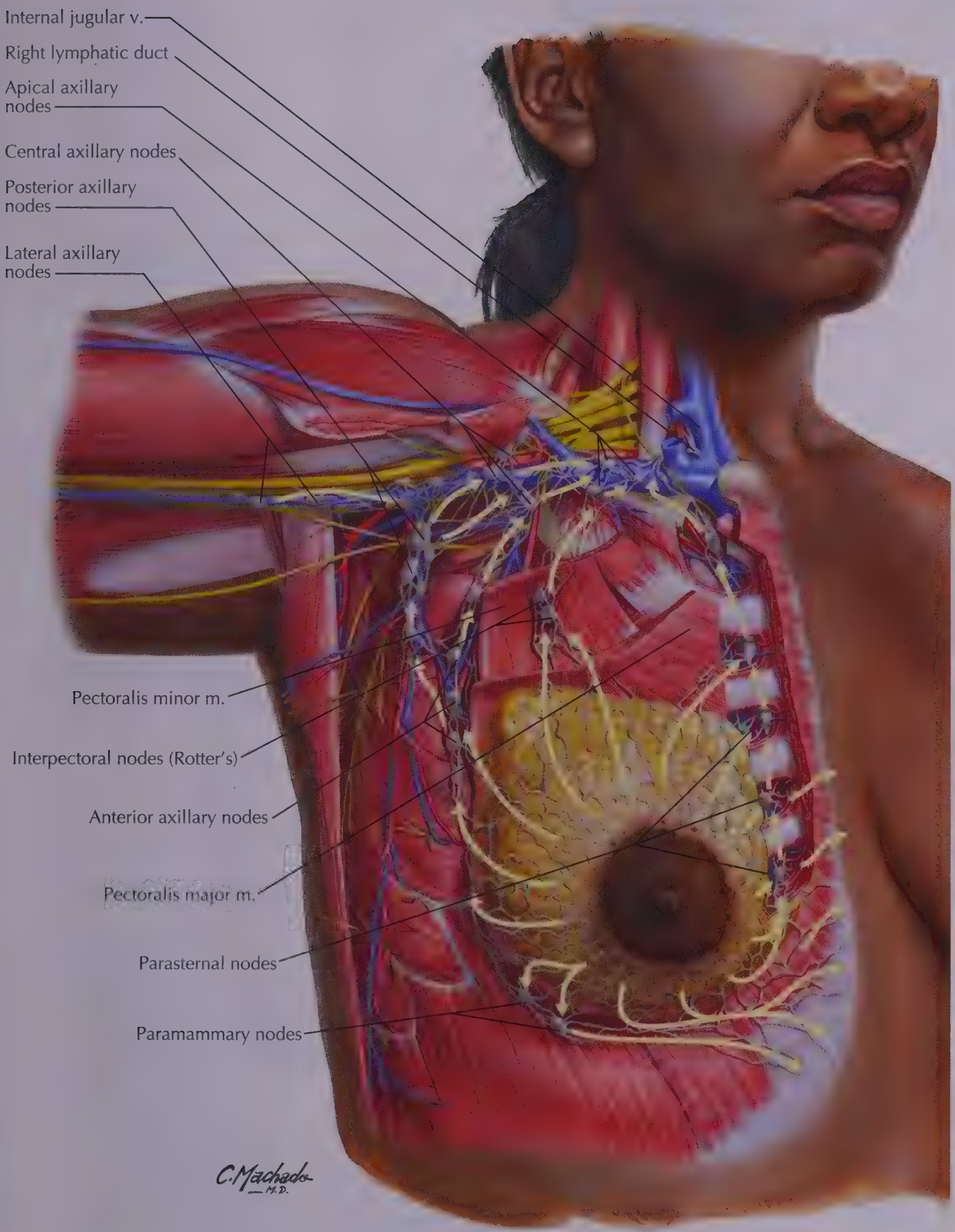

Anterolateral dissection
Pectoralis major m. (deep to pectoral fascia)
Serratus anterior m.
External abdominal oblique m.
Suspensory ligaments of breast (Cooper's)
Areolar glands (of Montgomery)
Areola
Nipple
Adipose tissue
Lactiferous ducts
Mammary gland lobules
Lactiferous sinus
Clavicle
Subclavius m.
2nd rib
Pectoralis major m.
Pectoral fascia
Intercostal mm.
Intercostal v.
Intercostal a.
Intercostal n.
Lung
6th rib
Suspensory ligaments of breast (Cooper's)
Lactiferous ducts
Lactiferous sinus
Mammary gland lobules
Adipose tissue
F. Netter M.D.
Sagittal section


Internal thoracic a.
Subclavian a.
Perforating branches of internal thoracic a.
Medial mammary branches of internal thoracic a.
Axillary a.
Brachial plexus
Brachial a.
Long thoracic n.
Lateral thoracic a.
Lateral mammary branches of lateral thoracic a.
Axillary tail (of Spence) of mammary gland
Lateral mammary branches of posterior intercostal aa.
F. Netter M.D.

See also Plate 208

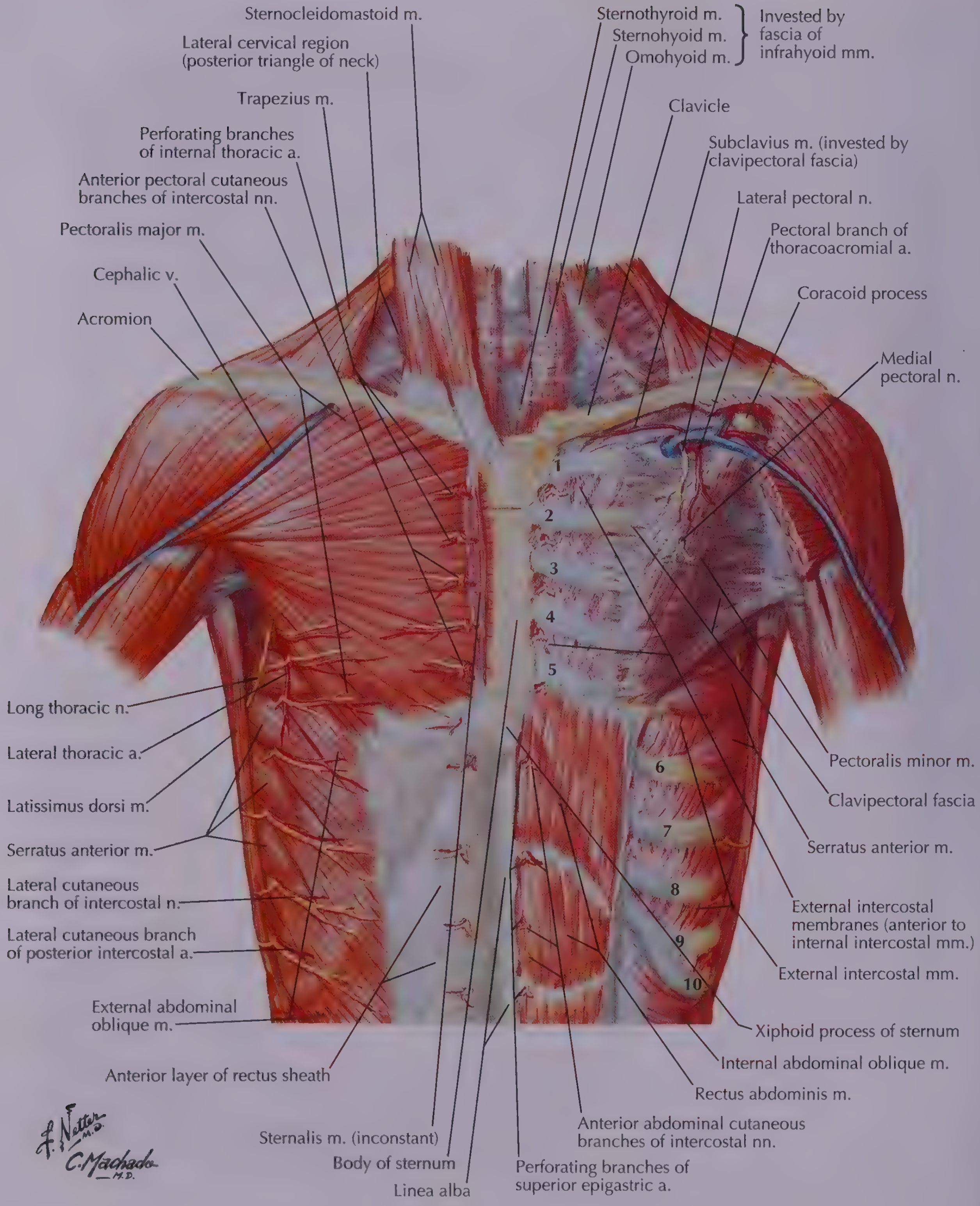

Parasternal nodes
Apical axillary nodes
Interpectoral nodes (Rotter's)
Central axillary nodes
Lateral axillary nodes
Posterior axillary nodes
Anterior axillary nodes
Lymph vessels to anterior mediastinal nodes
Lymph vessels between breasts
Lymph vessels to inferior diaphragmatic nodes and hepatic nodes
F. Netter M.D.

See also Plate 207


Internal jugular v.
Right lymphatic duct
Apical axillary nodes
Central axillary nodes
Posterior axillary nodes
Lateral axillary nodes
Pectoralis minor m.
Interpectoral nodes (Rotter's)
Anterior axillary nodes
Pectoralis major m.
Parasternal nodes
Paramammary nodes
C. Machado M.D.

Anterior Thoracic Wall: Superficial Dissection

See also Plates BP 42, BP 43


Sternocleidomastoid m.
Lateral cervical region (posterior triangle of neck)
Trapezius m.
Perforating branches of internal thoracic a.
Anterior pectoral cutaneous branches of intercostal nn.
Pectoralis major m.
Cephalic v.
Acromion
Long thoracic n.
Lateral thoracic a.
Latissimus dorsi m.
Serratus anterior m.
Lateral cutaneous branch of intercostal n.
Lateral cutaneous branch of posterior intercostal a.
External abdominal oblique m.
Anterior layer of rectus sheath
Sternalis m. (inconstant)
Body of sternum
Linea alba
Perforating branches of superior epigastric a.
Anterior abdominal cutaneous branches of intercostal nn.
Rectus abdominis m.
Internal abdominal oblique m.
Xiphoid process of sternum
External intercostal mm.
External intercostal membranes (anterior to internal intercostal mm.)
Serratus anterior m.
Clavipectoral fascia
Pectoralis minor m.
Medial pectoral n.
Coracoid process
Pectoral branch of thoracoacromial a.
Lateral pectoral n.
Subclavius m. (invested by clavipectoral fascia)
Clavicle
Sternothyroid m.
Sternohyoid m.
Omohyoid m.
Invested by fascia of infrahyoid mm.
1
2
3
4
5
6
7
8
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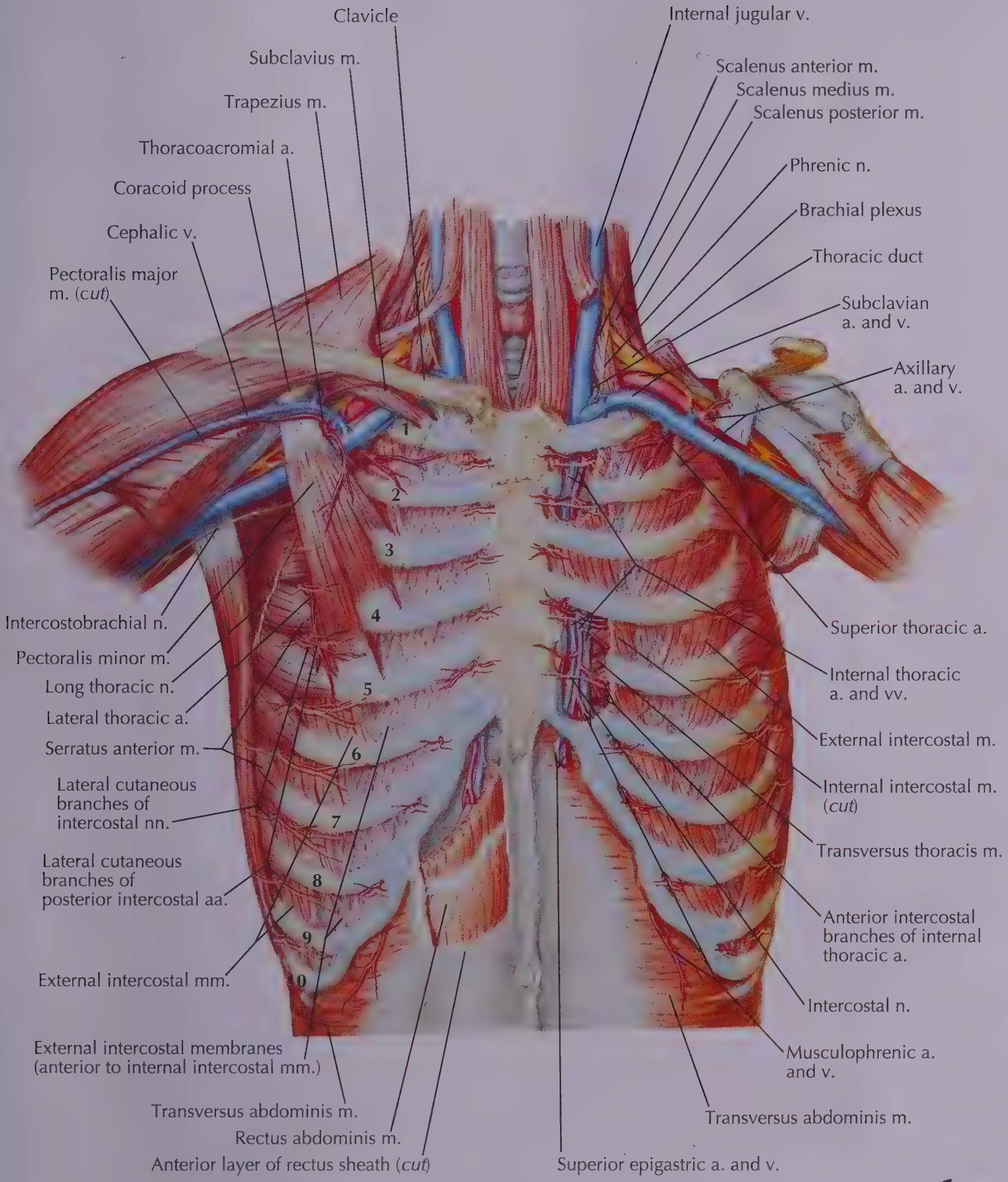
10
F. Netter M.D.
C. Machado M.D.

Anterior Thoracic Wall: Deeper Dissection

See also Plates BP 41, BP 42


Clavicle
Subclavius m.
Trapezius m.
Thoracoacromial a.
Coracoid process
Cephalic v.
Pectoralis major m. (*cut*)
Intercostobrachial n.
Pectoralis minor m.
Long thoracic n.
Lateral thoracic a.
Serratus anterior m.
Lateral cutaneous branches of intercostal nn.
Lateral cutaneous branches of posterior intercostal aa.
External intercostal mm.
External intercostal membranes (anterior to internal intercostal mm.)
Transversus abdominis m.
Rectus abdominis m.
Anterior layer of rectus sheath (*cut*)
Internal jugular v.
Scalenus anterior m.
Scalenus medius m.
Scalenus posterior m.
Phrenic n.
Brachial plexus
Thoracic duct
Subclavian a. and v.
Axillary a. and v.
Superior thoracic a.
Internal thoracic a. and vv.
External intercostal m.
Internal intercostal m. (*cut*)
Transversus thoracis m.
Anterior intercostal branches of internal thoracic a.
Intercostal n.
Musculophrenic a. and v.
Transversus abdominis m.
Superior epigastric a. and v.
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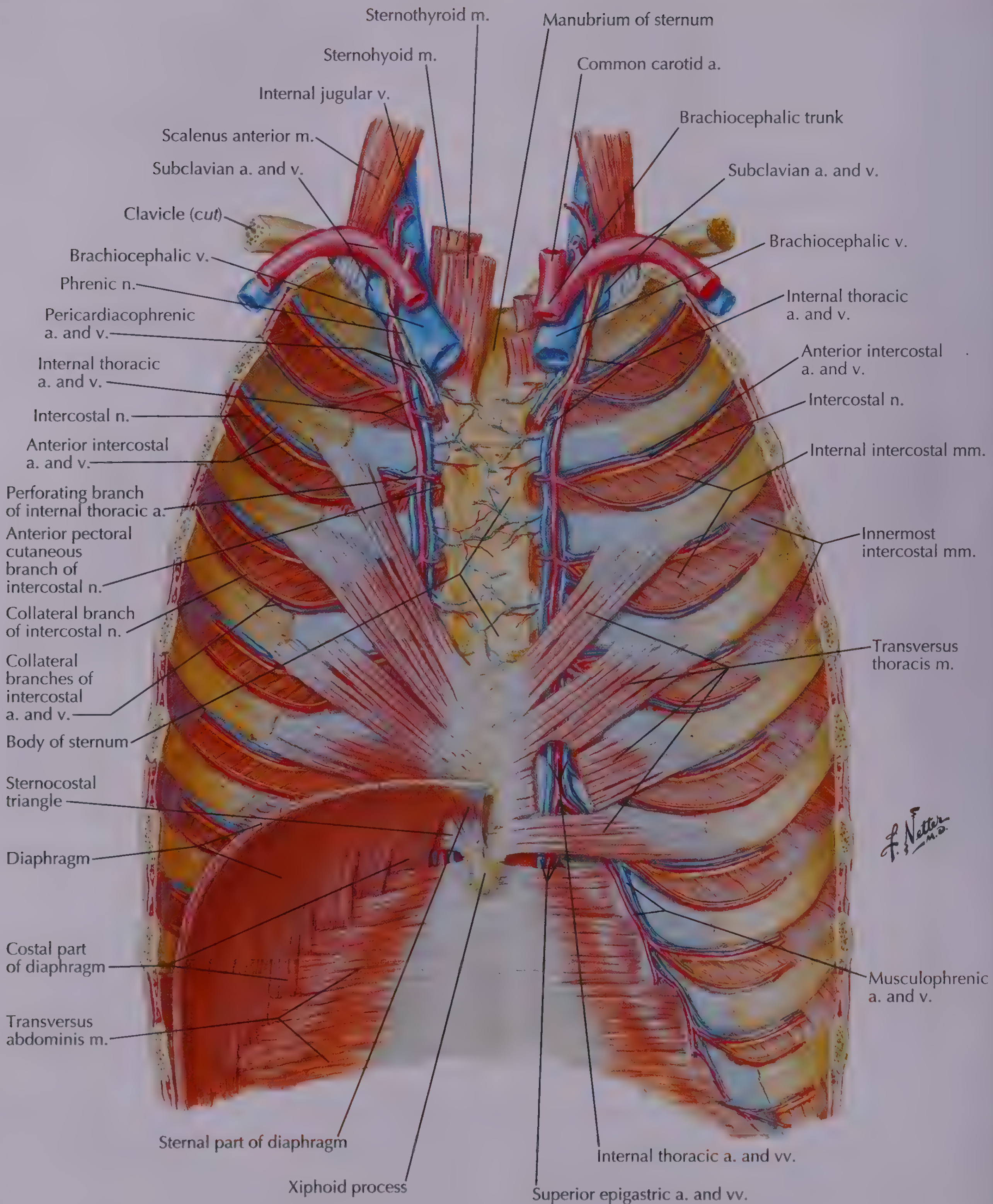
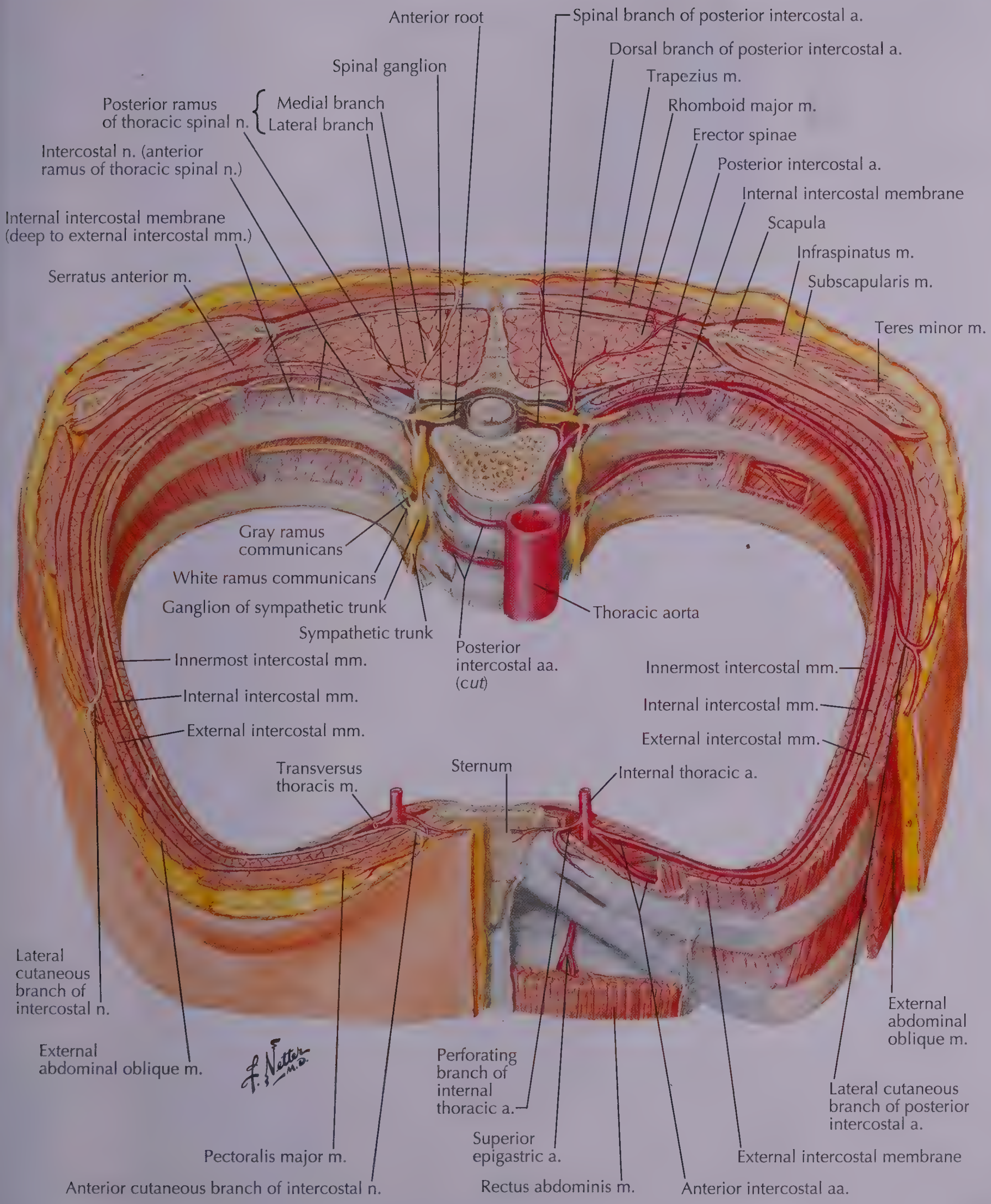
Anterior Thoracic Wall: Internal View

See also Plate BP 42

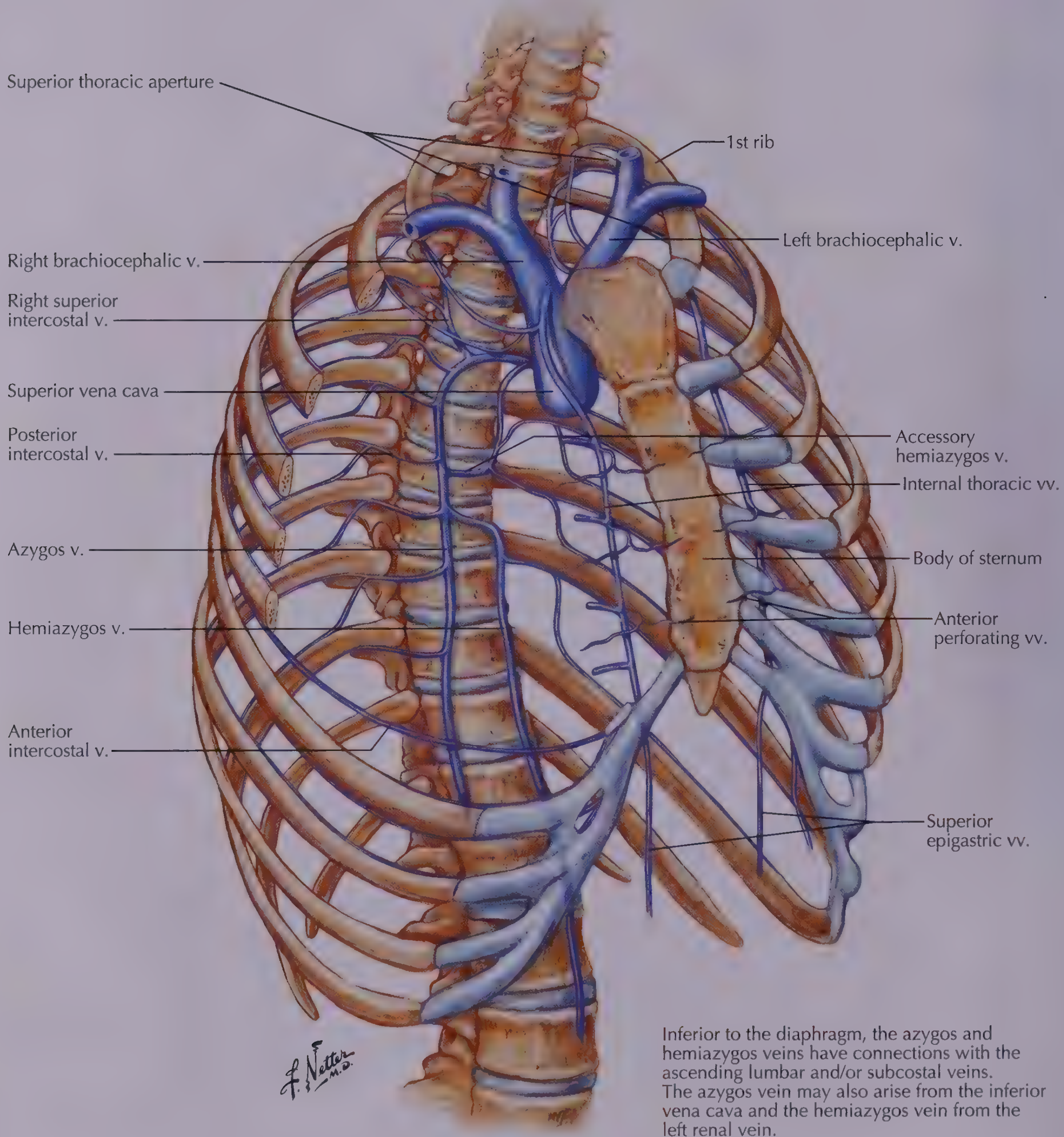

Sternothyroid m.
Manubrium of sternum
Sternohyoid m.
Common carotid a.
Internal jugular v.
Brachiocephalic trunk
Scalenus anterior m.
Subclavian a. and v.
Subclavian a. and v.
Clavicle (cut)
Brachiocephalic v.
Brachiocephalic v.
Phrenic n.
Internal thoracic a. and v.
Pericardiacophrenic a. and v.
Anterior intercostal a. and v.
Internal thoracic a. and v.
Intercostal n.
Intercostal n.
Internal intercostal mm.
Anterior intercostal a. and v.
Perforating branch of internal thoracic a.
Innermost intercostal mm.
Anterior pectoral cutaneous branch of intercostal n.
Collateral branch of intercostal n.
Transversus thoracis m.
Collateral branches of intercostal a. and v.
Body of sternum
Sternocostal triangle
Diaphragm
Costal part of diaphragm
Musculophrenic a. and v.
Transversus abdominis m.
Sternal part of diaphragm
Internal thoracic a. and vv.
Xiphoid process
Superior epigastric a. and vv.
F. Netter M.D.

See also Plates 279, 287


Anterior root
Spinal branch of posterior intercostal a.
Dorsal branch of posterior intercostal a.
Spinal ganglion
Trapezius m.
Posterior ramus of thoracic spinal n.
Medial branch
Lateral branch
Rhomboid major m.
Erector spinae
Intercostal n. (anterior ramus of thoracic spinal n.)
Posterior intercostal a.
Internal intercostal membrane
Internal intercostal membrane (deep to external intercostal mm.)
Scapula
Infraspinatus m.
Serratus anterior m.
Subscapularis m.
Teres minor m.
Gray ramus communicans
White ramus communicans
Ganglion of sympathetic trunk
Thoracic aorta
Sympathetic trunk
Posterior intercostal aa. (cut)
Innermost intercostal mm.
Internal intercostal mm.
External intercostal mm.
Innermost intercostal mm.
Internal intercostal mm.
External intercostal mm.
Transversus thoracis m.
Sternum
Internal thoracic a.
Lateral cutaneous branch of intercostal n.
External abdominal oblique m.
External abdominal oblique m.
F. Netter M.D.
Perforating branch of internal thoracic a.
Lateral cutaneous branch of posterior intercostal a.
Superior epigastric a.
Pectoralis major m.
External intercostal membrane
Anterior cutaneous branch of intercostal n.
Rectus abdominis m.
Anterior intercostal aa.

Veins of Thoracic Wall

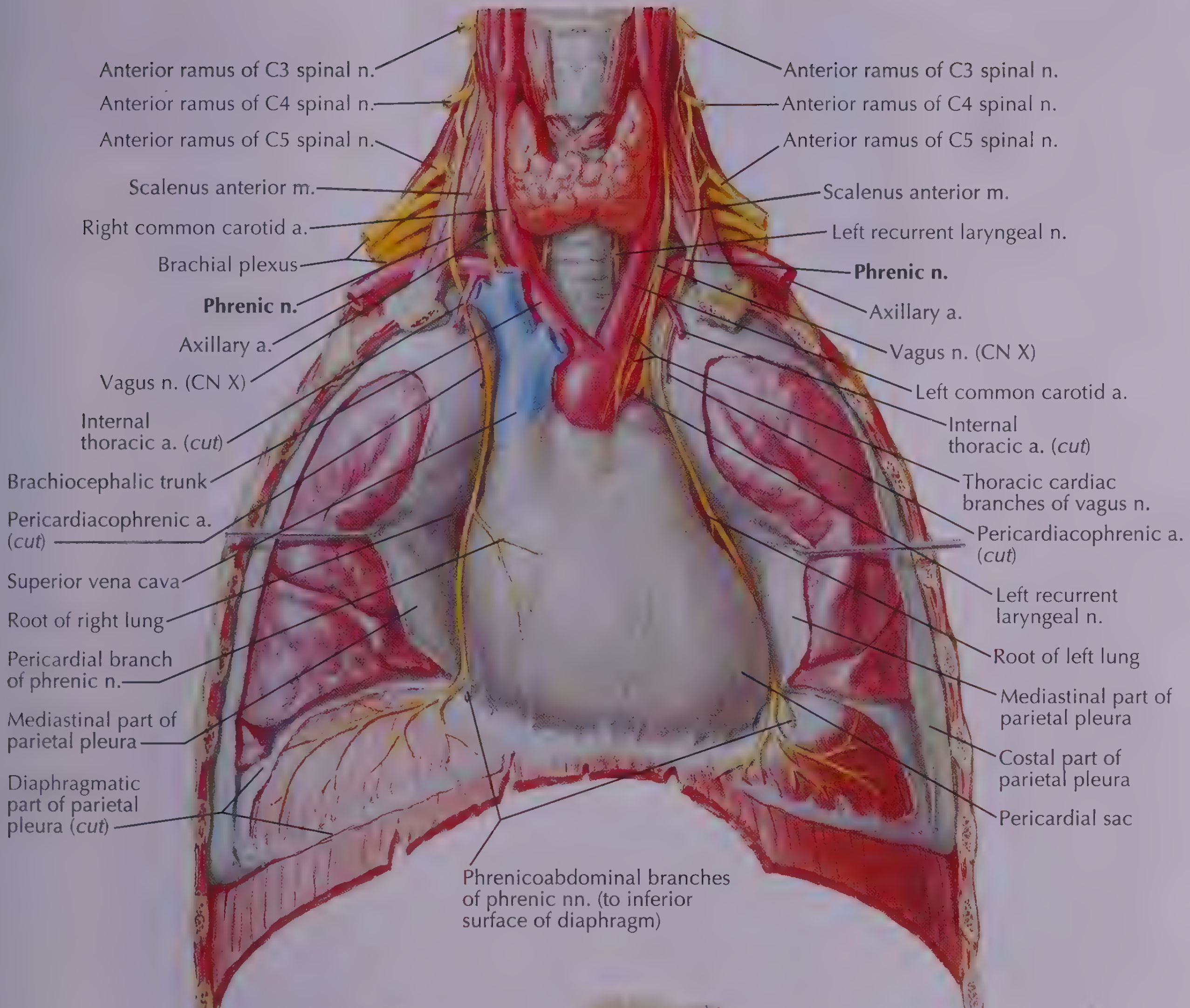
See also Plates 234, 259, 277

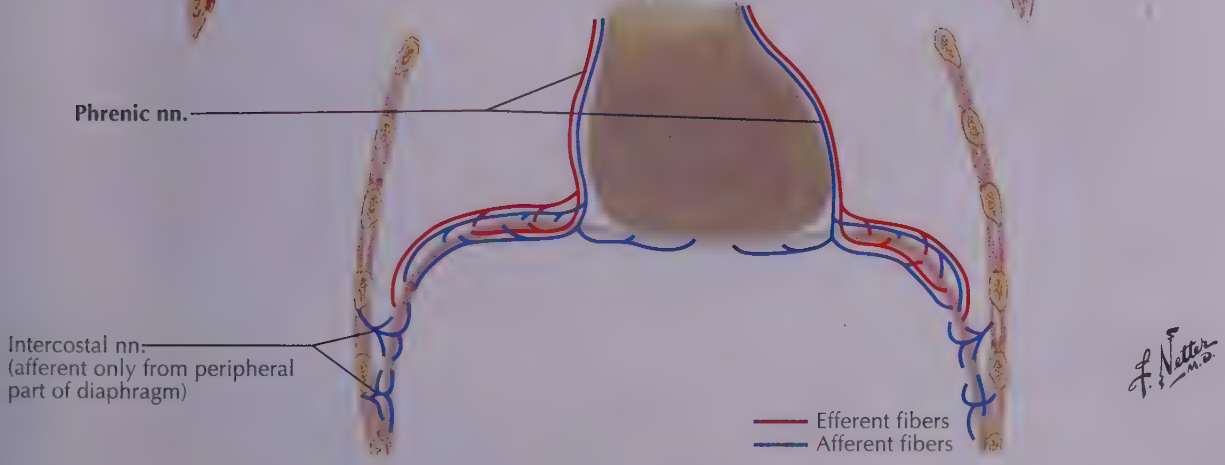

Superior thoracic aperture
1st rib
Left brachiocephalic v.
Right brachiocephalic v.
Right superior intercostal v.
Superior vena cava
Posterior intercostal v.
Accessory hemiazygos v.
Internal thoracic vv.
Azygos v.
Body of sternum
Hemiazygos v.
Anterior perforating vv.
Anterior intercostal v.
Superior epigastric vv.

Inferior to the diaphragm, the azygos and hemiazygos veins have connections with the ascending lumbar and/or subcostal veins. The azygos vein may also arise from the inferior vena cava and the hemiazygos vein from the left renal vein.

Phrenic Nerve and Relationship to Pericardium

See also Plates 56, 103


Anterior ramus of C3 spinal n.
Anterior ramus of C4 spinal n.
Anterior ramus of C5 spinal n.
Scalenus anterior m.
Right common carotid a.
Brachial plexus
Phrenic n.
Axillary a.
Vagus n. (CN X)
Internal thoracic a. (*cut*)
Brachiocephalic trunk
Pericardiacophrenic a. (*cut*)
Superior vena cava
Root of right lung
Pericardial branch of phrenic n.
Mediastinal part of parietal pleura
Diaphragmatic part of parietal pleura (*cut*)
Anterior ramus of C3 spinal n.
Anterior ramus of C4 spinal n.
Anterior ramus of C5 spinal n.
Scalenus anterior m.
Left recurrent laryngeal n.
Phrenic n.
Axillary a.
Vagus n. (CN X)
Left common carotid a.
Internal thoracic a. (*cut*)
Thoracic cardiac branches of vagus n.
Pericardiacophrenic a. (*cut*)
Left recurrent laryngeal n.
Root of left lung
Mediastinal part of parietal pleura
Costal part of parietal pleura
Pericardial sac
Phrenicoabdominal branches of phrenic nn. (to inferior surface of diaphragm)


Phrenic nn.
Intercostal nn. (afferent only from peripheral part of diaphragm)
Efferent fibers
Afferent fibers
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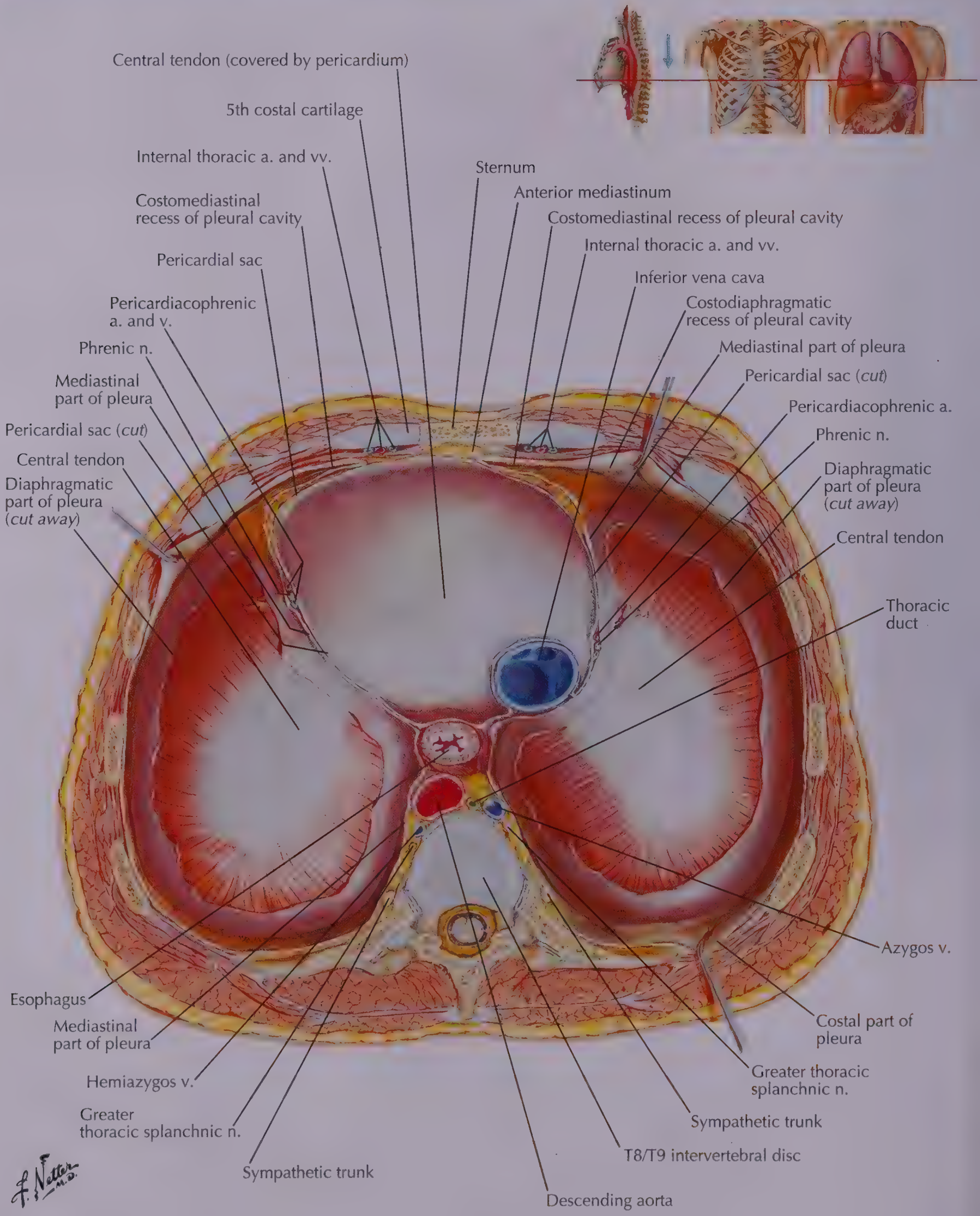
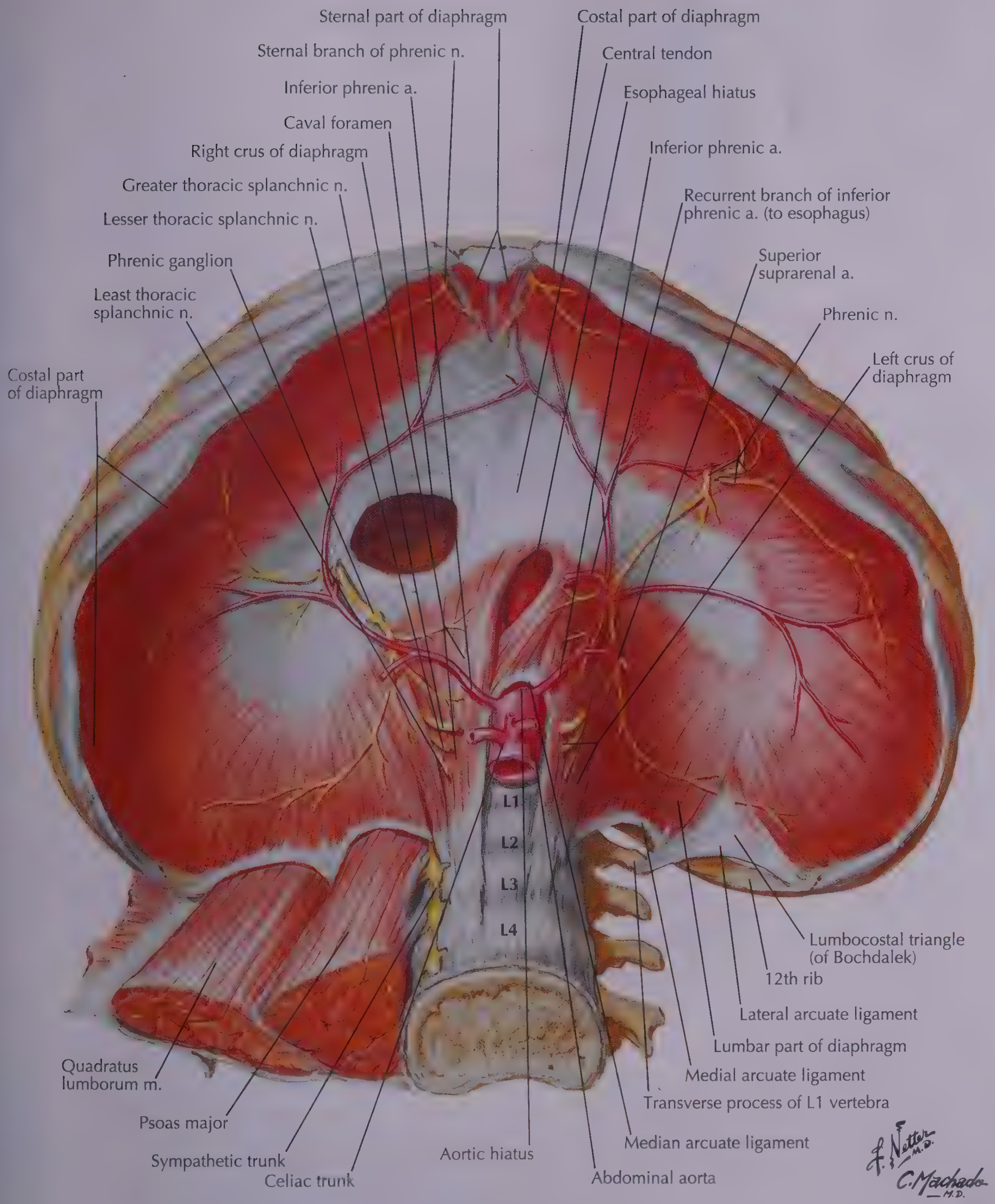
See also Plates 253, 254


Central tendon (covered by pericardium)
5th costal cartilage
Internal thoracic a. and vv.
Costomediastinal recess of pleural cavity
Pericardial sac
Pericardiacophrenic a. and v.
Phrenic n.
Mediastinal part of pleura
Pericardial sac (*cut*)
Central tendon
Diaphragmatic part of pleura (*cut away*)
Sternum
Anterior mediastinum
Costomediastinal recess of pleural cavity
Internal thoracic a. and vv.
Inferior vena cava
Costodiaphragmatic recess of pleural cavity
Mediastinal part of pleura
Pericardial sac (*cut*)
Pericardiacophrenic a.
Phrenic n.
Diaphragmatic part of pleura (*cut away*)
Central tendon
Thoracic duct
Azygos v.
Costal part of pleura
Greater thoracic splanchnic n.
Sympathetic trunk
T8/T9 intervertebral disc
Descending aorta
Sympathetic trunk
Greater thoracic splanchnic n.
Hemiazygos v.
Mediastinal part of pleura
Esophagus

Diaphragm: Abdominal Surface

See also Plates 283, 284


Sternal part of diaphragm
Sternal branch of phrenic n.
Inferior phrenic a.
Caval foramen
Right crus of diaphragm
Greater thoracic splanchnic n.
Lesser thoracic splanchnic n.
Phrenic ganglion
Least thoracic splanchnic n.
Costal part of diaphragm
Costal part of diaphragm
Central tendon
Esophageal hiatus
Inferior phrenic a.
Recurrent branch of inferior phrenic a. (to esophagus)
Superior suprarenal a.
Phrenic n.
Left crus of diaphragm
L1
L2
L3
L4
Lumbocostal triangle (of Bochdalek)
12th rib
Lateral arcuate ligament
Lumbar part of diaphragm
Medial arcuate ligament
Transverse process of L1 vertebra
Median arcuate ligament
Abdominal aorta
Aortic hiatus
Celiac trunk
Sympathetic trunk
Psoas major
Quadratus lumborum m.
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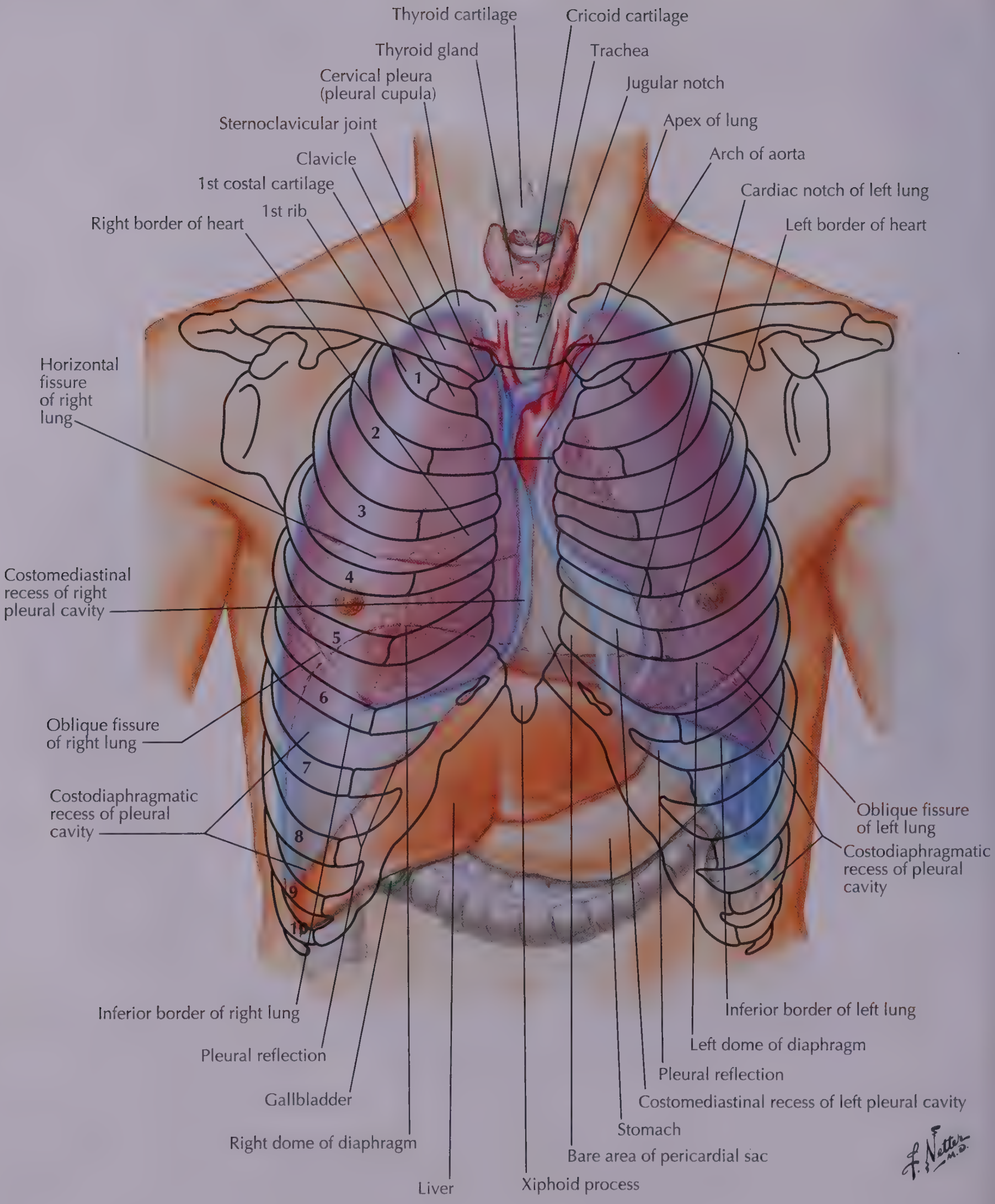
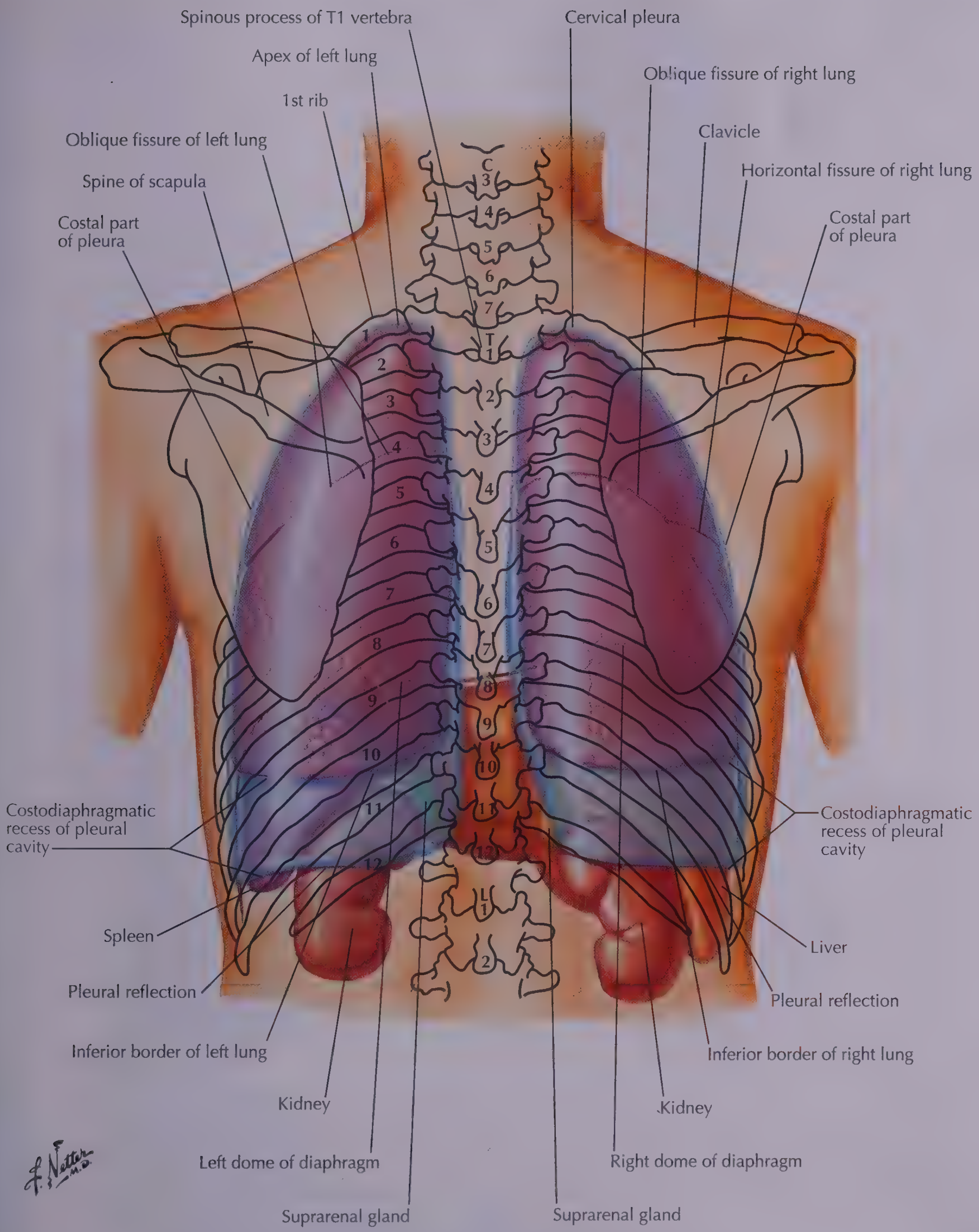
C. Machado M.D.

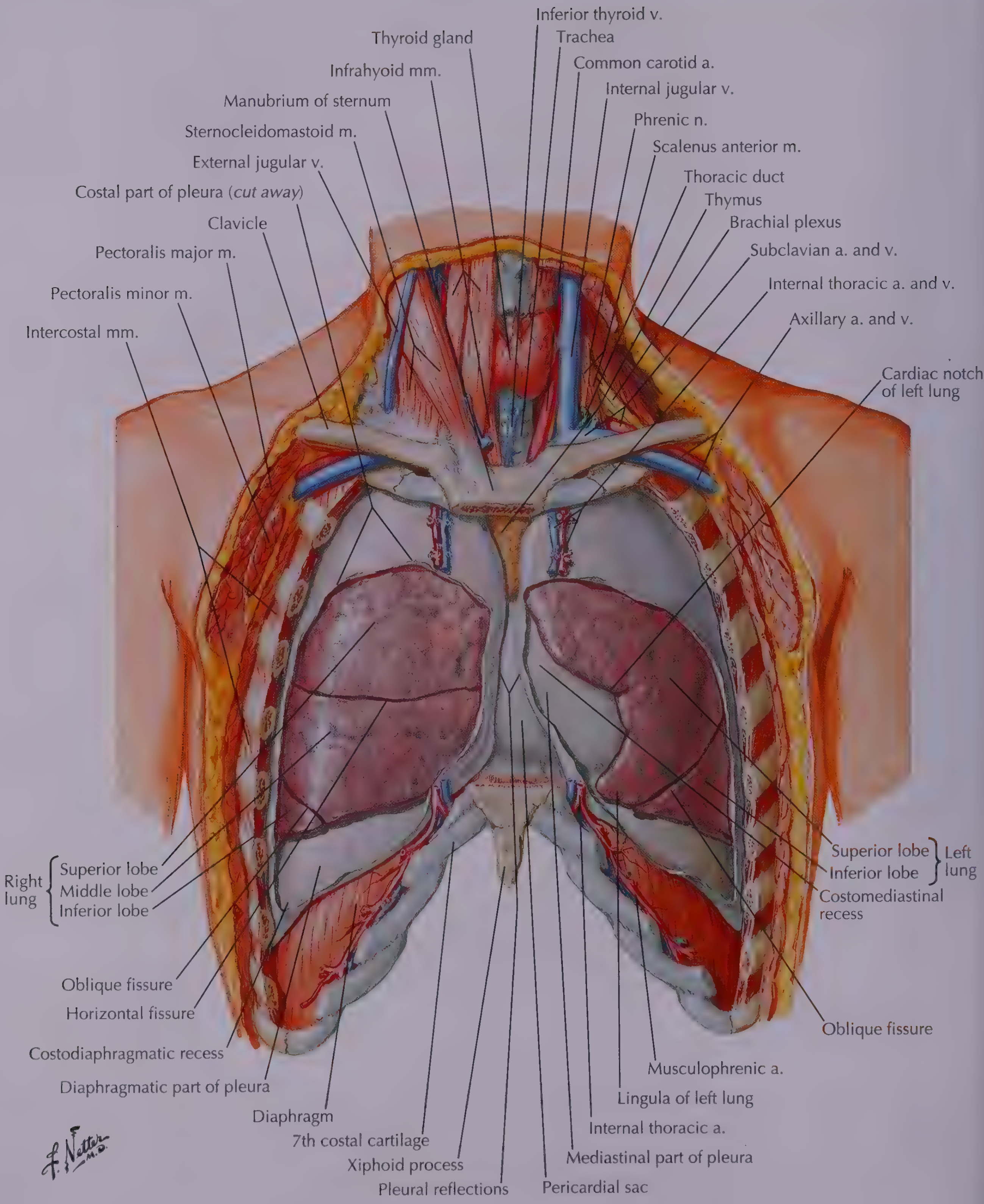
Lungs in Thorax: Anterior View


Thyroid cartilage
Cricoid cartilage
Thyroid gland
Trachea
Cervical pleura (pleural cupula)
Jugular notch
Sternoclavicular joint
Apex of lung
Clavicle
Arch of aorta
1st costal cartilage
Cardiac notch of left lung
1st rib
Right border of heart
Left border of heart
Horizontal fissure of right lung
1
2
3
4
5
6
7
8
9
10
Costomediastinal recess of right pleural cavity
Oblique fissure of right lung
Costodiaphragmatic recess of pleural cavity
Oblique fissure of left lung
Costodiaphragmatic recess of pleural cavity
Inferior border of right lung
Inferior border of left lung
Left dome of diaphragm
Pleural reflection
Pleural reflection
Gallbladder
Costomediastinal recess of left pleural cavity
Stomach
Right dome of diaphragm
Bare area of pericardial sac
Liver
Xiphoid process


Spinous process of T1 vertebra
Cervical pleura
Apex of left lung
Oblique fissure of right lung
1st rib
Oblique fissure of left lung
Clavicle
Spine of scapula
Horizontal fissure of right lung
Costal part of pleura
Costal part of pleura
C 3
4
5
6
7
T 1
2
3
4
5
6
7
8
9
10
11
12
L 1
2
1
2
3
4
5
6
7
8
9
10
11
12
Costodiaphragmatic recess of pleural cavity
Costodiaphragmatic recess of pleural cavity
Spleen
Liver
Pleural reflection
Pleural reflection
Inferior border of left lung
Inferior border of right lung
Kidney
Kidney
Left dome of diaphragm
Right dome of diaphragm
Suprarenal gland
Suprarenal gland

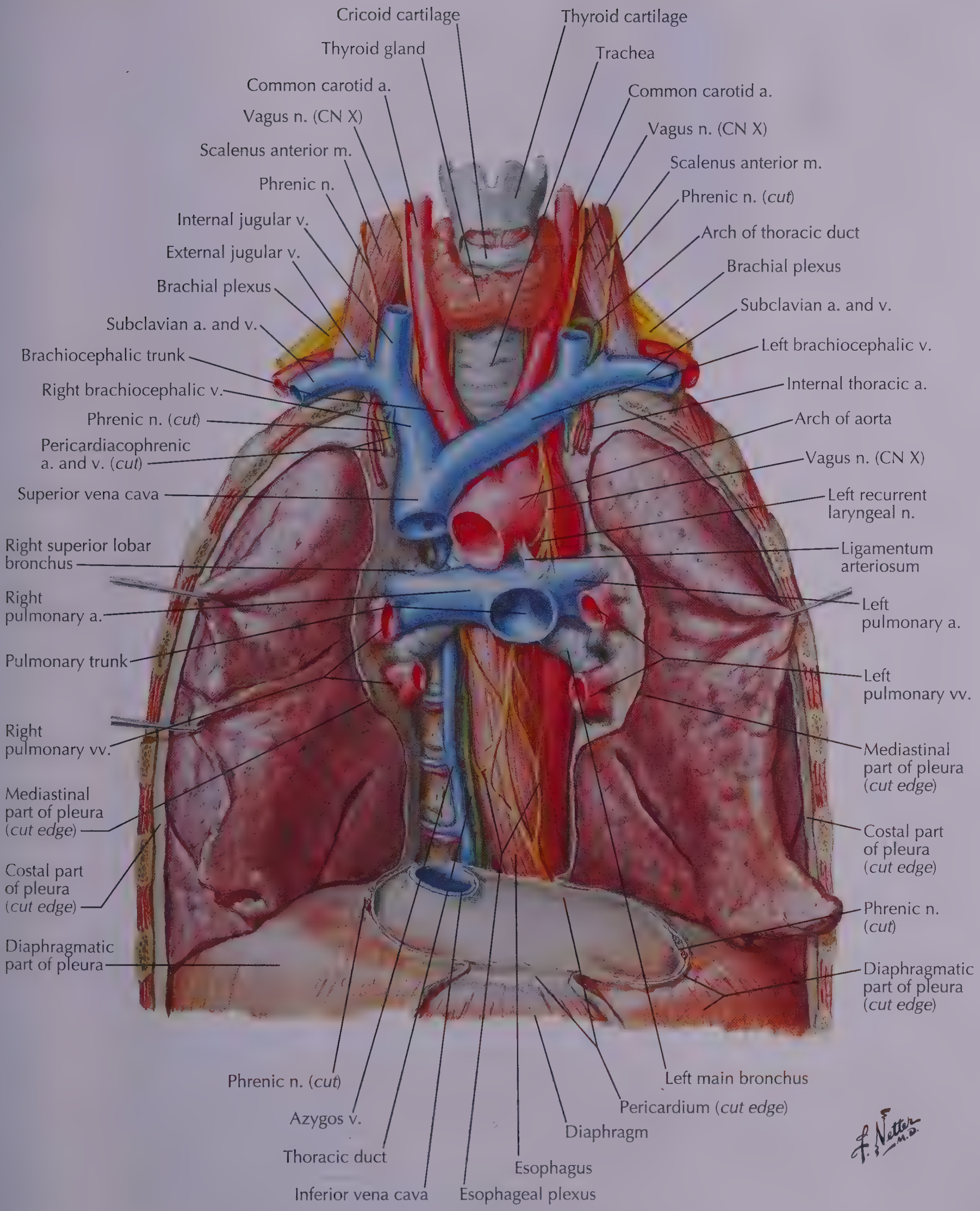
Lungs in Situ: Anterior View

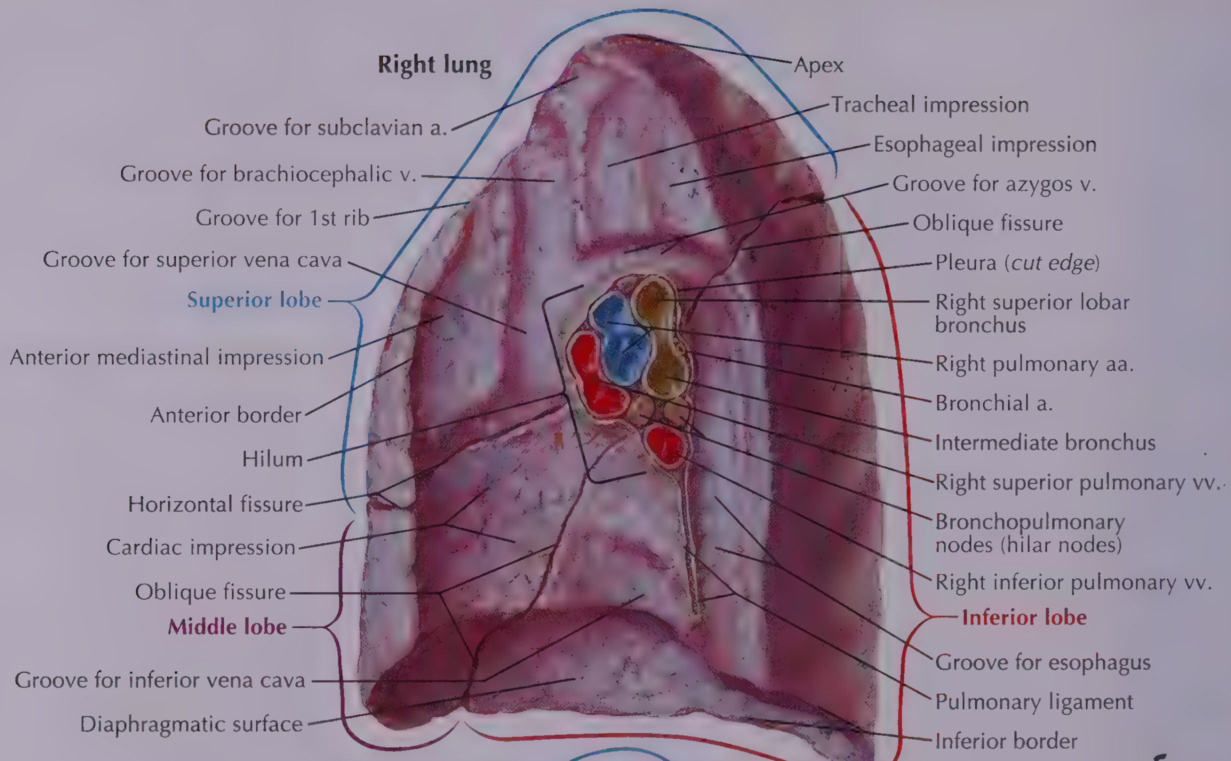
See also Plate 17

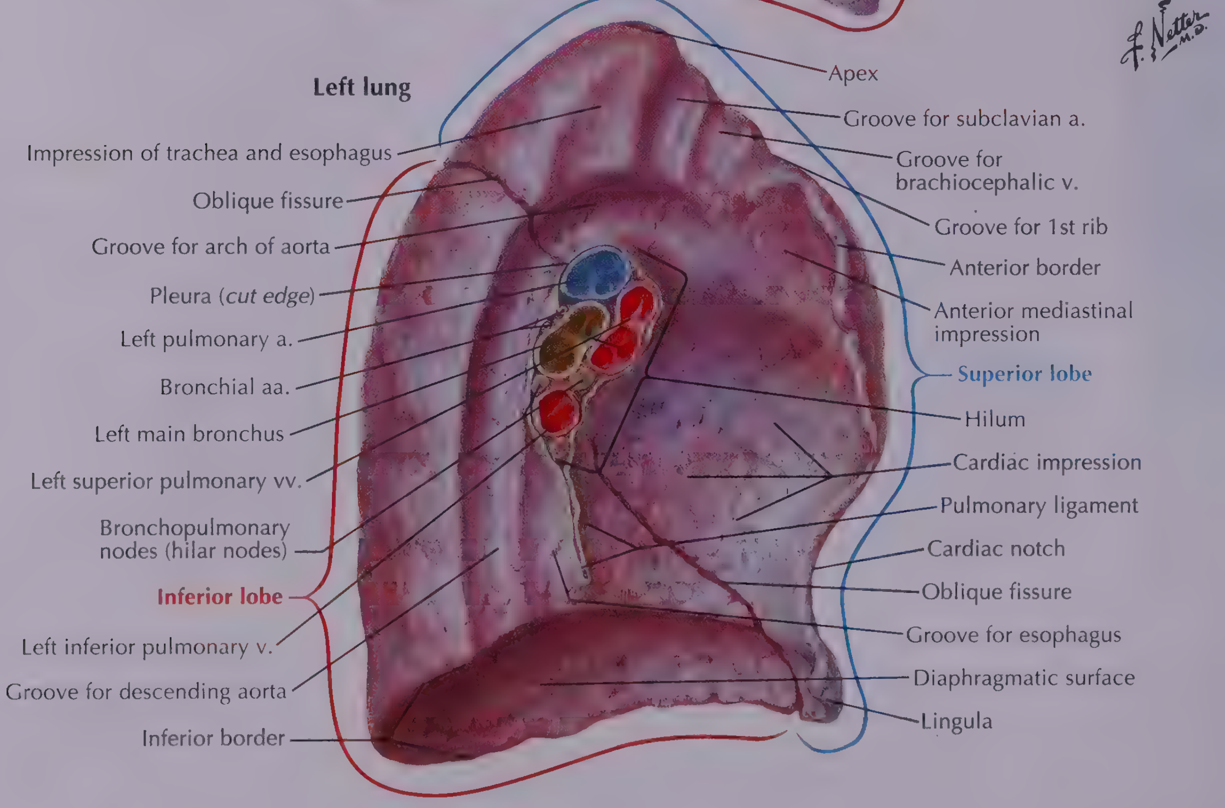

Inferior thyroid v.
Thyroid gland
Trachea
Common carotid a.
Infrahyoid mm.
Internal jugular v.
Manubrium of sternum
Phrenic n.
Sternocleidomastoid m.
Scalenus anterior m.
External jugular v.
Thoracic duct
Costal part of pleura (*cut away*)
Thymus
Clavicle
Brachial plexus
Pectoralis major m.
Subclavian a. and v.
Internal thoracic a. and v.
Pectoralis minor m.
Axillary a. and v.
Intercostal mm.
Cardiac notch of left lung
Right lung
Superior lobe
Middle lobe
Inferior lobe
Superior lobe
Inferior lobe
Left lung
Costomediastinal recess
Oblique fissure
Horizontal fissure
Oblique fissure
Costodiaphragmatic recess
Musculophrenic a.
Diaphragmatic part of pleura
Lingula of left lung
Diaphragm
Internal thoracic a.
7th costal cartilage
Mediastinal part of pleura
Xiphoid process
Pleural reflections
Pericardial sac

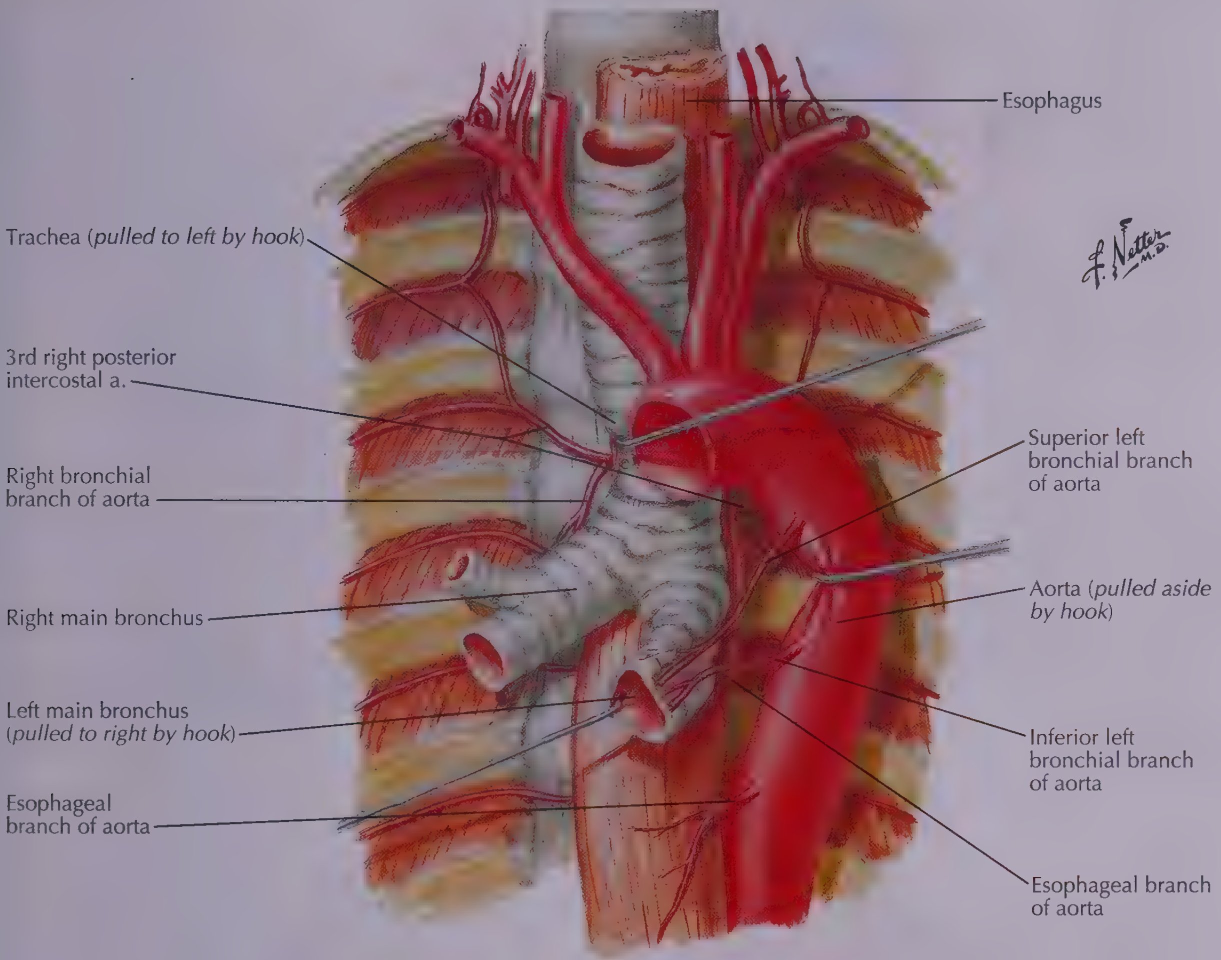
Great Vessels of Mediastinum

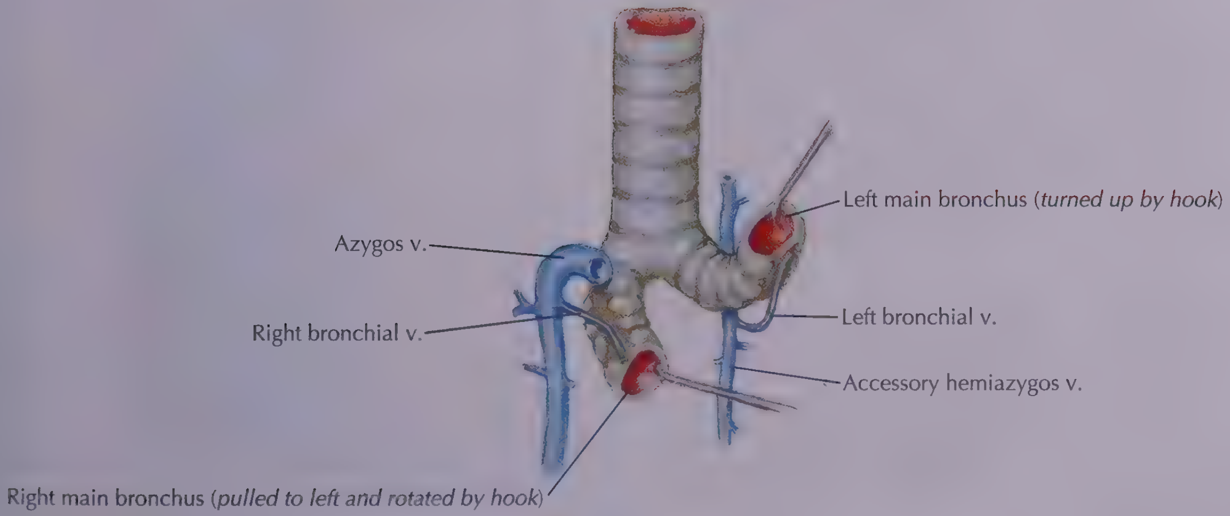
See also Plate 227


Cricoid cartilage
Thyroid gland
Common carotid a.
Vagus n. (CN X)
Scalenus anterior m.
Phrenic n.
Internal jugular v.
External jugular v.
Brachial plexus
Subclavian a. and v.
Brachiocephalic trunk
Right brachiocephalic v.
Phrenic n. (*cut*)
Pericardiacophrenic a. and v. (*cut*)
Superior vena cava
Right superior lobar bronchus
Right pulmonary a.
Pulmonary trunk
Right pulmonary vv.
Mediastinal part of pleura (*cut edge*)
Costal part of pleura (*cut edge*)
Diaphragmatic part of pleura
Thyroid cartilage
Trachea
Common carotid a.
Vagus n. (CN X)
Scalenus anterior m.
Phrenic n. (*cut*)
Arch of thoracic duct
Brachial plexus
Subclavian a. and v.
Left brachiocephalic v.
Internal thoracic a.
Arch of aorta
Vagus n. (CN X)
Left recurrent laryngeal n.
Ligamentum arteriosum
Left pulmonary a.
Left pulmonary vv.
Mediastinal part of pleura (*cut edge*)
Costal part of pleura (*cut edge*)
Phrenic n. (*cut*)
Diaphragmatic part of pleura (*cut edge*)
Phrenic n. (*cut*)
Azygos v.
Thoracic duct
Inferior vena cava
Esophageal plexus
Esophagus
Diaphragm
Pericardium (*cut edge*)
Left main bronchus


Right lung
Apex
Groove for subclavian a.
Tracheal impression
Groove for brachiocephalic v.
Esophageal impression
Groove for azygos v.
Groove for 1st rib
Oblique fissure
Groove for superior vena cava
Pleura (*cut edge*)
Superior lobe
Right superior lobar bronchus
Anterior mediastinal impression
Right pulmonary aa.
Anterior border
Bronchial a.
Hilum
Intermediate bronchus
Right superior pulmonary vv.
Horizontal fissure
Bronchopulmonary nodes (hilar nodes)
Cardiac impression
Oblique fissure
Right inferior pulmonary vv.
Middle lobe
Inferior lobe
Groove for esophagus
Groove for inferior vena cava
Pulmonary ligament
Diaphragmatic surface
Inferior border

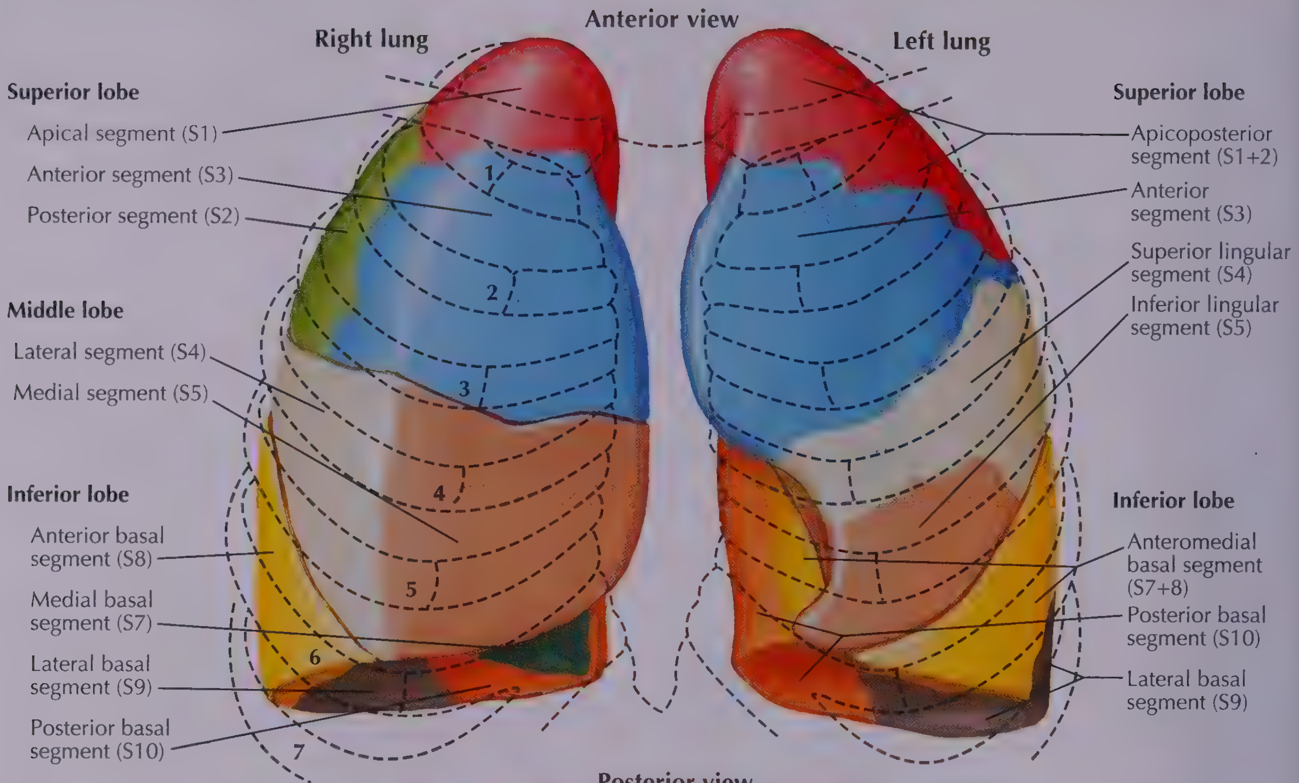

Left lung
Apex
Groove for subclavian a.
Impression of trachea and esophagus
Groove for brachiocephalic v.
Oblique fissure
Groove for 1st rib
Groove for arch of aorta
Anterior border
Pleura (*cut edge*)
Anterior mediastinal impression
Left pulmonary a.
Superior lobe
Bronchial aa.
Hilum
Left main bronchus
Cardiac impression
Left superior pulmonary vv.
Pulmonary ligament
Bronchopulmonary nodes (hilar nodes)
Cardiac notch
Inferior lobe
Oblique fissure
Left inferior pulmonary v.
Groove for esophagus
Groove for descending aorta
Diaphragmatic surface
Inferior border
Lingula

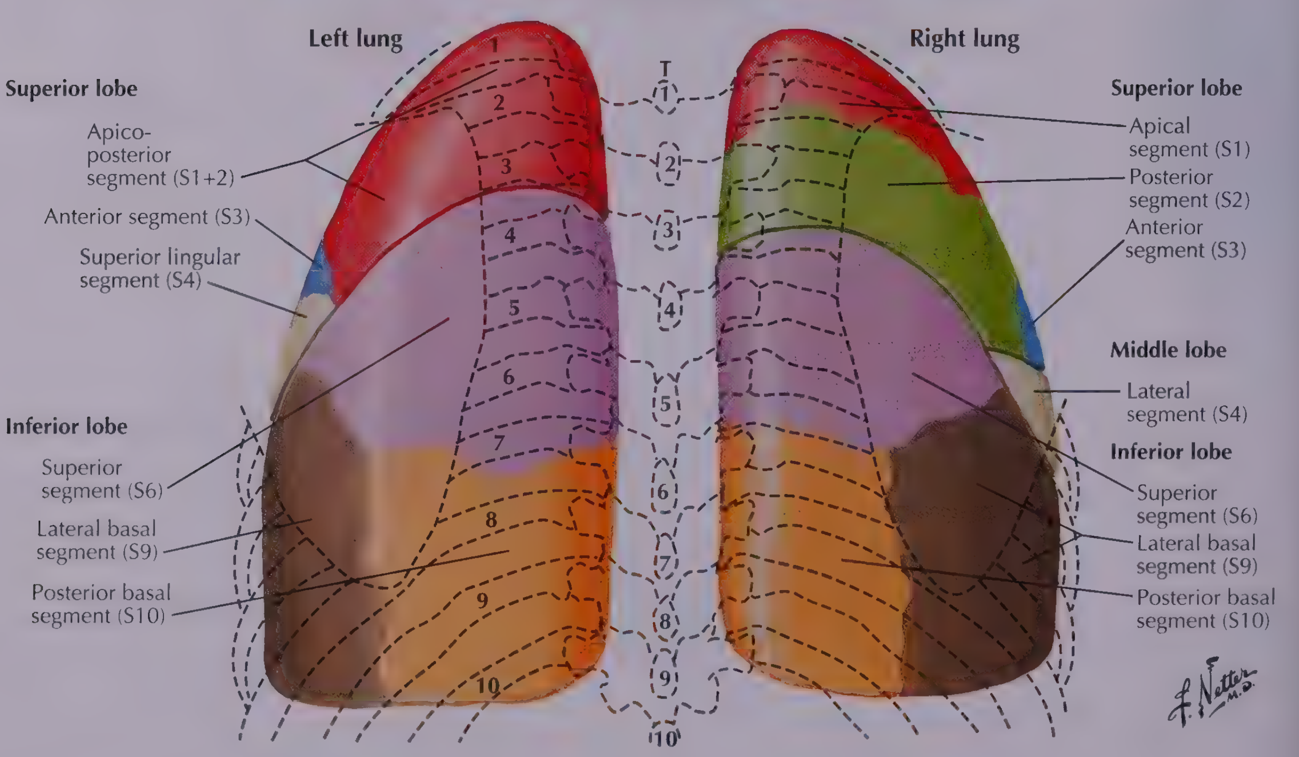

Esophagus
Trachea (*pulled to left by hook*)
3rd right posterior intercostal a.
Right bronchial branch of aorta
Right main bronchus
Left main bronchus (*pulled to right by hook*)
Esophageal branch of aorta
Superior left bronchial branch of aorta
Aorta (*pulled aside by hook*)
Inferior left bronchial branch of aorta
Esophageal branch of aorta


Left main bronchus (*turned up by hook*)
Azygos v.
Left bronchial v.
Right bronchial v.
Accessory hemiazygos v.
Right main bronchus (*pulled to left and rotated by hook*)

Bronchopulmonary Segments: Anterior and Posterior Views

See also Plate 226

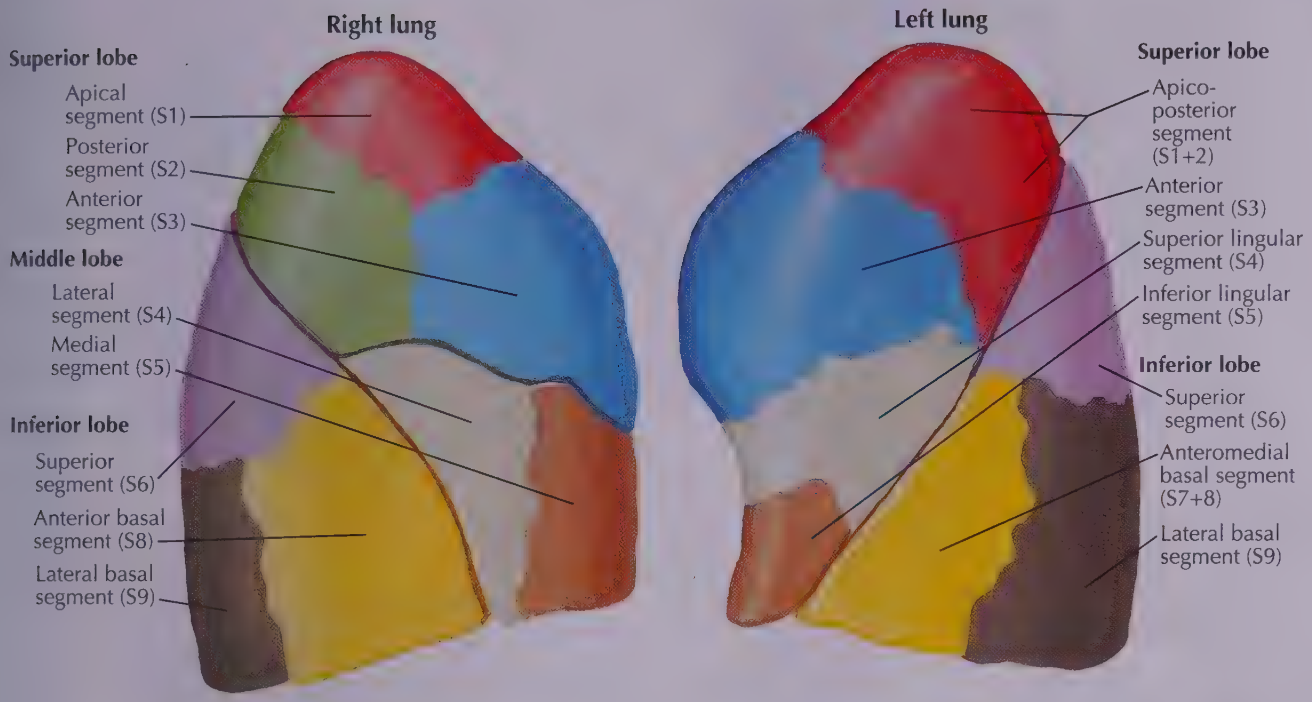

Anterior view
Right lung
Left lung
Superior lobe
Apical segment (S1)
Anterior segment (S3)
Posterior segment (S2)
Middle lobe
Lateral segment (S4)
Medial segment (S5)
Inferior lobe
Anterior basal segment (S8)
Medial basal segment (S7)
Lateral basal segment (S9)
Posterior basal segment (S10)
Superior lobe
Apicoposterior segment (S1+2)
Anterior segment (S3)
Superior lingular segment (S4)
Inferior lingular segment (S5)
Inferior lobe
Anteromedial basal segment (S7+8)
Posterior basal segment (S10)
Lateral basal segment (S9)
1
2
3
4
5
6
7


Posterior view
Left lung
Right lung
Superior lobe
Apico-posterior segment (S1+2)
Anterior segment (S3)
Superior lingular segment (S4)
Inferior lobe
Superior segment (S6)
Lateral basal segment (S9)
Posterior basal segment (S10)
Superior lobe
Apical segment (S1)
Posterior segment (S2)
Anterior segment (S3)
Middle lobe
Lateral segment (S4)
Inferior lobe
Superior segment (S6)
Lateral basal segment (S9)
Posterior basal segment (S10)
T
1
2
3
4
5
6
7
8
9
10

Bronchopulmonary Segments: Medial and Lateral Views

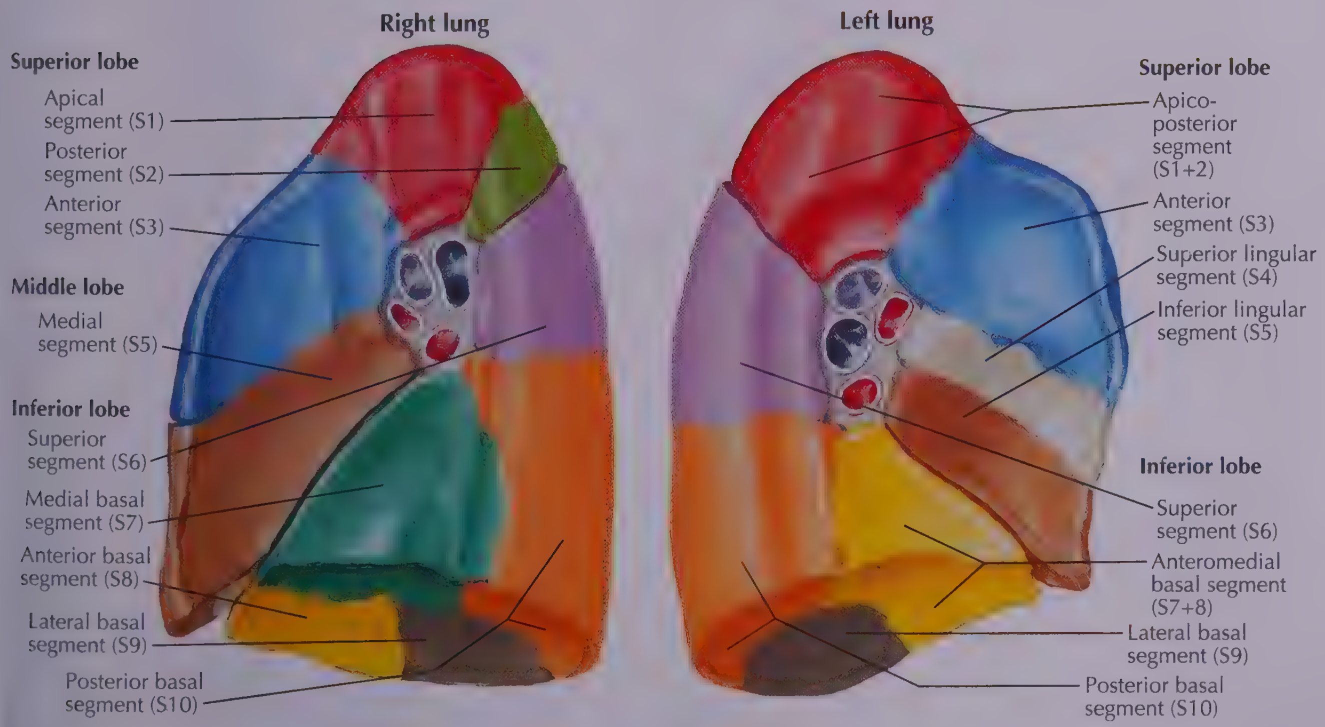
See also Plate 226

Lateral views

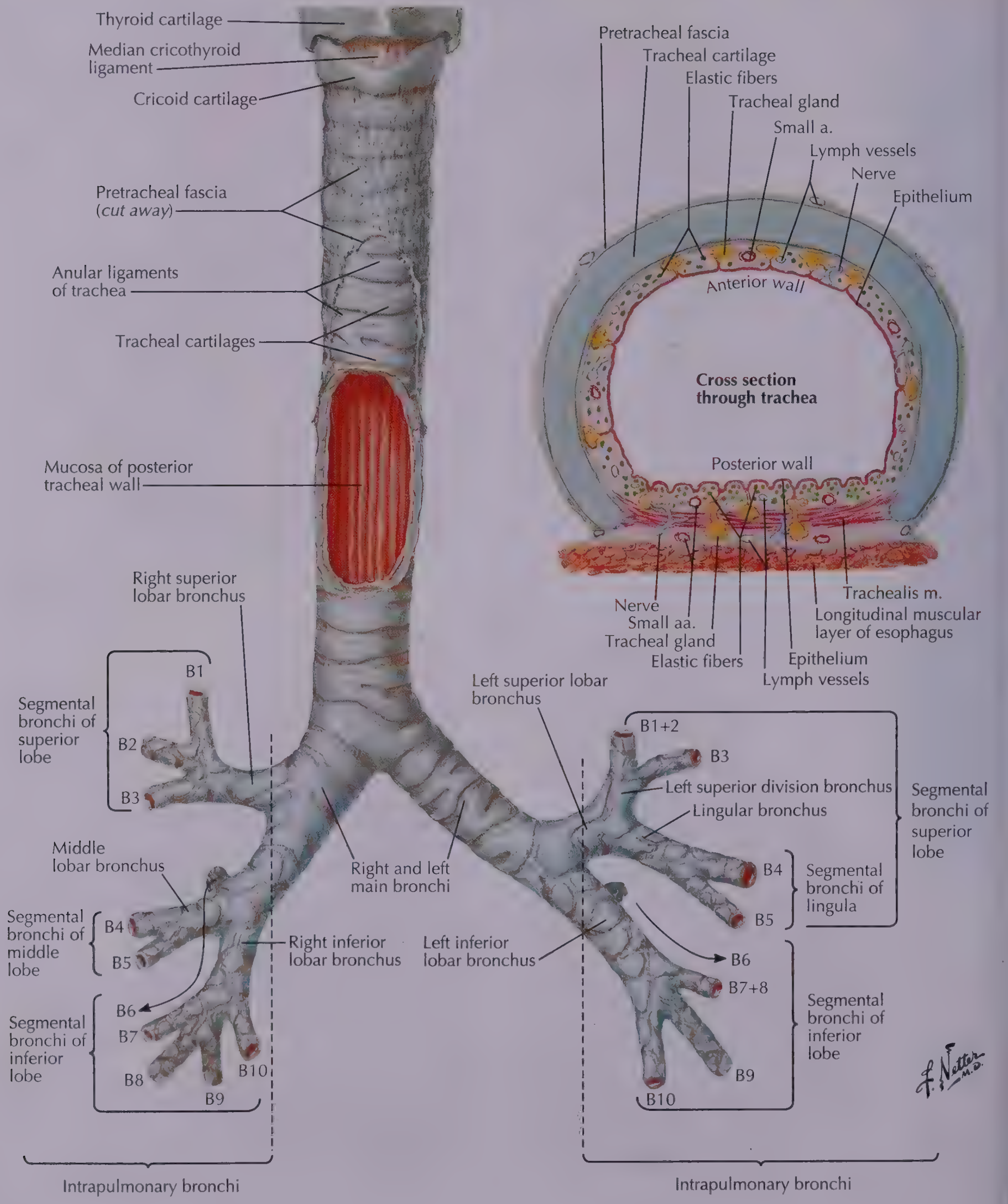

Right lung
Superior lobe
Apical segment (S1)
Posterior segment (S2)
Anterior segment (S3)
Middle lobe
Lateral segment (S4)
Medial segment (S5)
Inferior lobe
Superior segment (S6)
Anterior basal segment (S8)
Lateral basal segment (S9)
Left lung
Superior lobe
Apico-posterior segment (S1+2)
Anterior segment (S3)
Superior lingular segment (S4)
Inferior lingular segment (S5)
Inferior lobe
Superior segment (S6)
Anteromedial basal segment (S7+8)
Lateral basal segment (S9)

F. Netter M.D.

Medial views

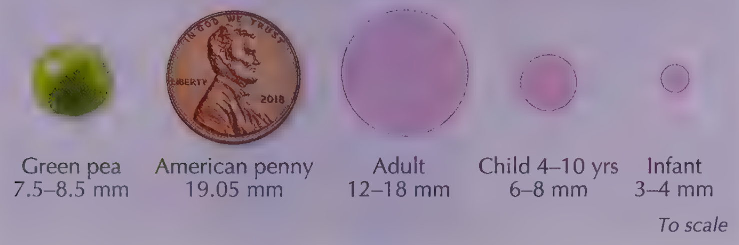

Right lung
Superior lobe
Apical segment (S1)
Posterior segment (S2)
Anterior segment (S3)
Middle lobe
Medial segment (S5)
Inferior lobe
Superior segment (S6)
Medial basal segment (S7)
Anterior basal segment (S8)
Lateral basal segment (S9)
Posterior basal segment (S10)
Left lung
Superior lobe
Apico-posterior segment (S1+2)
Anterior segment (S3)
Superior lingular segment (S4)
Inferior lingular segment (S5)
Inferior lobe
Superior segment (S6)
Anteromedial basal segment (S7+8)
Lateral basal segment (S9)
Posterior basal segment (S10)

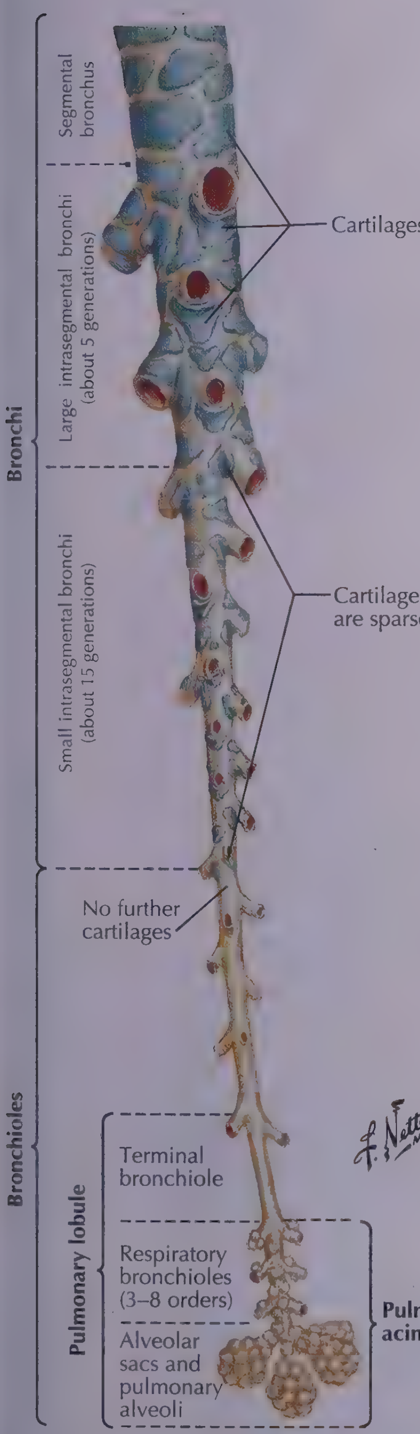
See also Plates 97, 222, 230


Thyroid cartilage
Median cricothyroid ligament
Cricoid cartilage
Pretracheal fascia (*cut away*)
Anular ligaments of trachea
Tracheal cartilages
Mucosa of posterior tracheal wall
Right superior lobar bronchus
Segmental bronchi of superior lobe
B1
B2
B3
Middle lobar bronchus
Segmental bronchi of middle lobe
B4
B5
Segmental bronchi of inferior lobe
B6
B7
B8
B9
B10
Right and left main bronchi
Right inferior lobar bronchus
Left inferior lobar bronchus
Intrapulmonary bronchi
Pretracheal fascia
Tracheal cartilage
Elastic fibers
Tracheal gland
Small a.
Lymph vessels
Nerve
Epithelium
Anterior wall
Cross section through trachea
Posterior wall
Nerve
Small aa.
Tracheal gland
Elastic fibers
Lymph vessels
Epithelium
Trachealis m.
Longitudinal muscular layer of esophagus
Left superior lobar bronchus
B1+2
B3
Left superior division bronchus
Lingular bronchus
Segmental bronchi of superior lobe
B4
B5
Segmental bronchi of lingula
B6
B7+8
B9
B10
Segmental bronchi of inferior lobe
Intrapulmonary bronchi

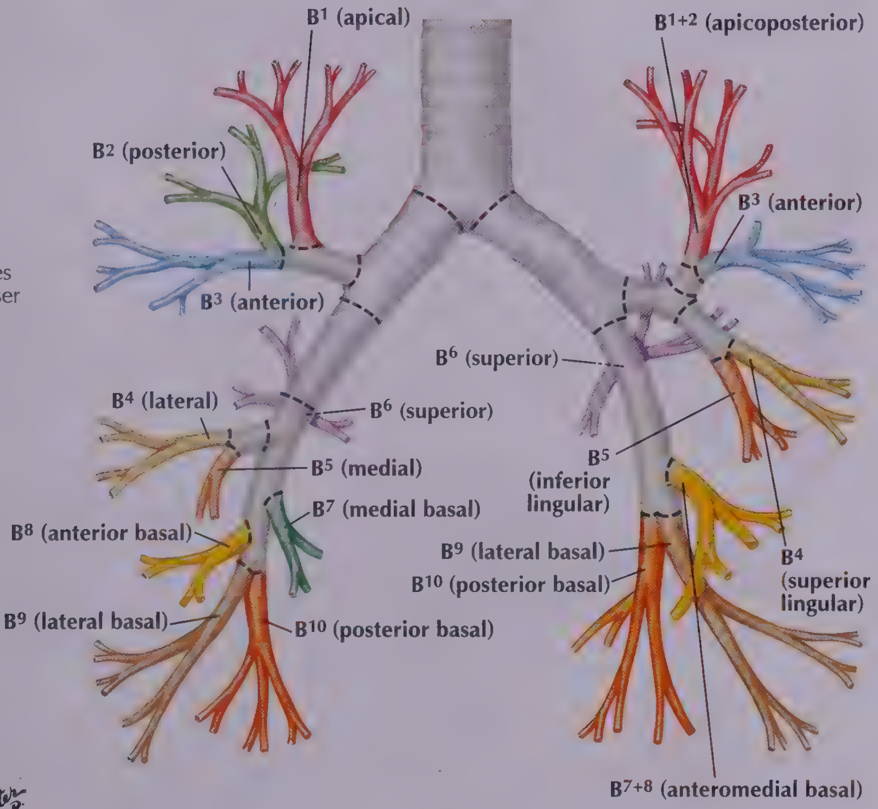
See also Plates 227, BP 44, BP 45

Approximate average diameter of lumen in main bronchi

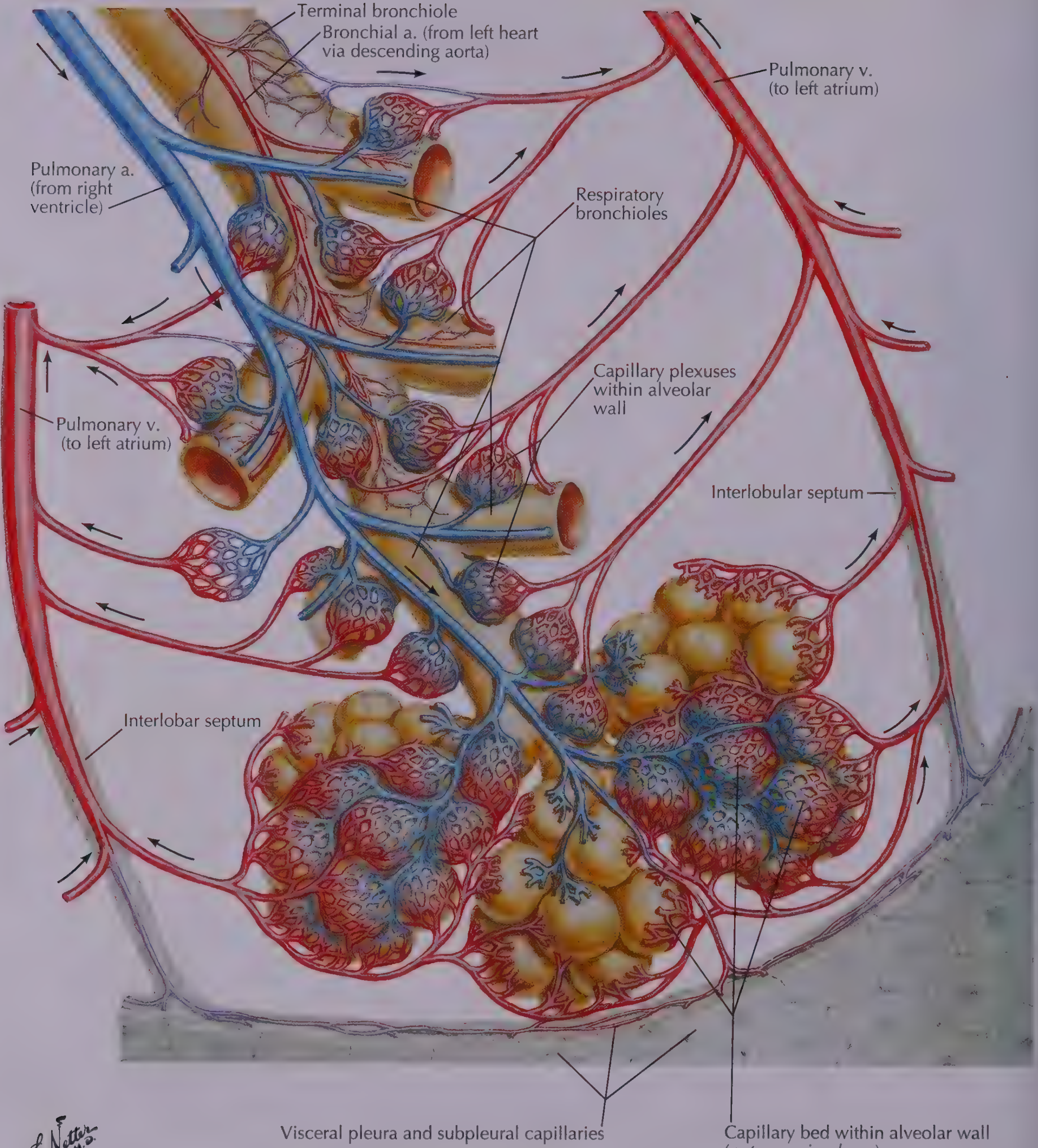

Green pea
7.5–8.5 mm
American penny
19.05 mm
IN GOD WE TRUST
LIBERTY
2018
Adult
12–18 mm
Child 4–10 yrs
6–8 mm
Infant
3–4 mm
To scale


Bronchi
Segmental bronchus
Large intrasegmental bronchi (about 5 generations)
Cartilages
Small intrasegmental bronchi (about 15 generations)
Cartilages are sparser
No further cartilages
Bronchioles
Pulmonary lobule
Terminal bronchiole
Respiratory bronchioles (3–8 orders)
Alveolar sacs and pulmonary alveoli
Pulmonary acinus
F. Netter M.D.

Subdivisions of intrapulmonary airways

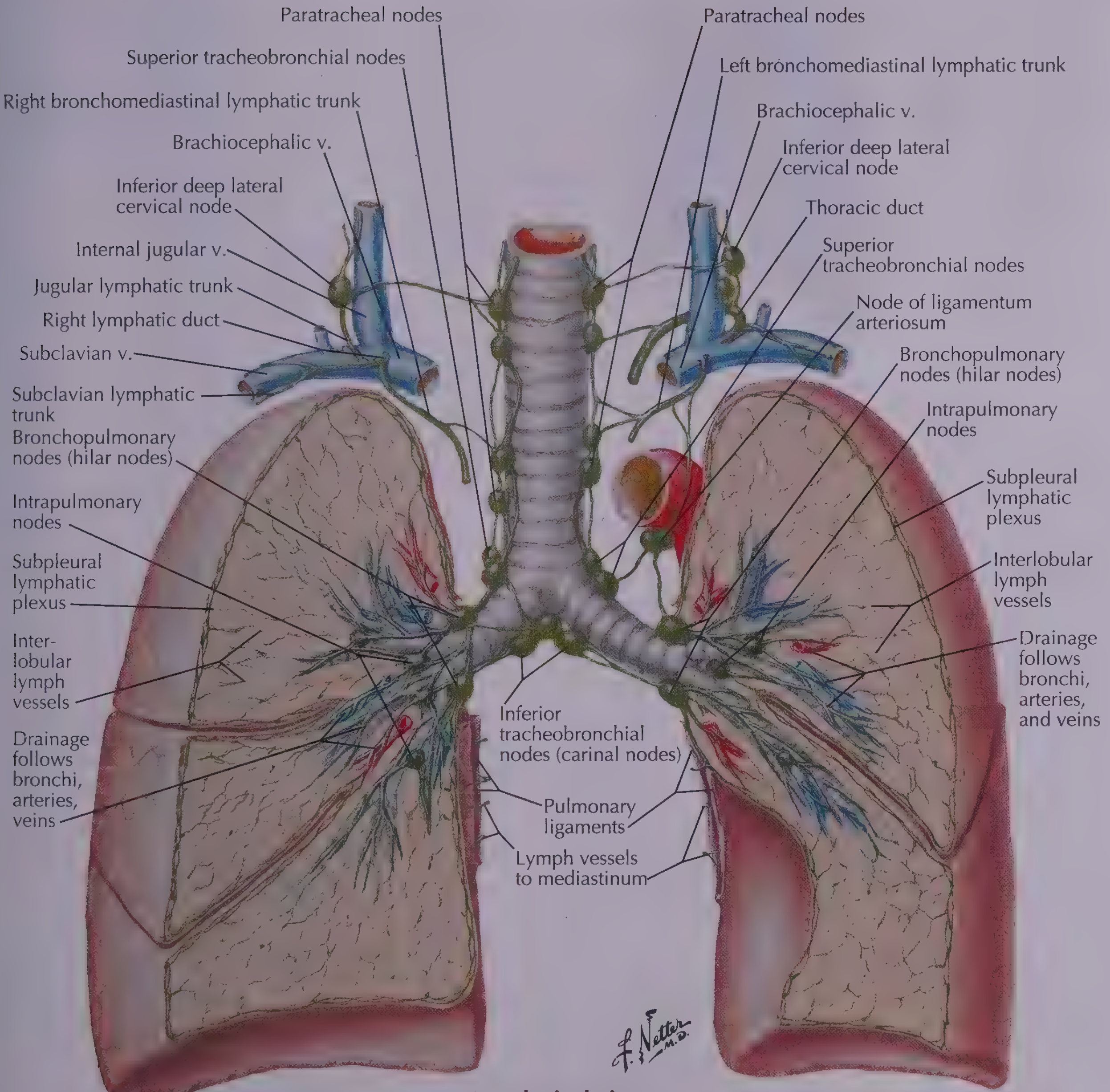

B1 (apical)
B2 (posterior)
B3 (anterior)
B4 (lateral)
B6 (superior)
B5 (medial)
B7 (medial basal)
B8 (anterior basal)
B9 (lateral basal)
B10 (posterior basal)
B1+2 (apicoposterior)
B3 (anterior)
B6 (superior)
B5 (inferior lingular)
B4 (superior lingular)
B9 (lateral basal)
B10 (posterior basal)
B7+8 (anteromedial basal)

Nomenclature in common usage for bronchopulmonary segments (Plates 223 and 224) is that of Jackson and Huber, and segmental bronchi are named accordingly. Bronchial subdivisions as far as the 5th or 6th generations also are shown but not labelled. Segmental bronchi (B) are numbered from 1 to 10 in each lung, corresponding to the pulmonary segments. In the left lung, B^1 and B^2 are combined, as are B^7 and B^8. Variations of the standard bronchial pattern shown here are common, especially in peripheral airways.


Terminal bronchiole
Bronchial a. (from left heart via descending aorta)
Pulmonary v. (to left atrium)
Pulmonary a. (from right ventricle)
Respiratory bronchioles
Capillary plexuses within alveolar wall
Pulmonary v. (to left atrium)
Interlobular septum
Interlobar septum
Visceral pleura and subpleural capillaries
Capillary bed within alveolar wall (*cut away in places*)
F. Netter M.D.

Pulmonary arteries and their branches distribute segmentally with the bronchi. Pulmonary veins and their tributaries drain intersegmentally.

See also Plates 101, 260, BP 51


Paratracheal nodes
Superior tracheobronchial nodes
Right bronchomediastinal lymphatic trunk
Brachiocephalic v.
Inferior deep lateral cervical node
Internal jugular v.
Jugular lymphatic trunk
Right lymphatic duct
Subclavian v.
Subclavian lymphatic trunk
Bronchopulmonary nodes (hilar nodes)
Intrapulmonary nodes
Subpleural lymphatic plexus
Interlobular lymph vessels
Drainage follows bronchi, arteries, veins
Paratracheal nodes
Left bronchomediastinal lymphatic trunk
Brachiocephalic v.
Inferior deep lateral cervical node
Thoracic duct
Superior tracheobronchial nodes
Node of ligamentum arteriosum
Bronchopulmonary nodes (hilar nodes)
Intrapulmonary nodes
Subpleural lymphatic plexus
Interlobular lymph vessels
Drainage follows bronchi, arteries, and veins
Inferior tracheobronchial nodes (carinal nodes)
Pulmonary ligaments
Lymph vessels to mediastinum
F. Netter M.D.

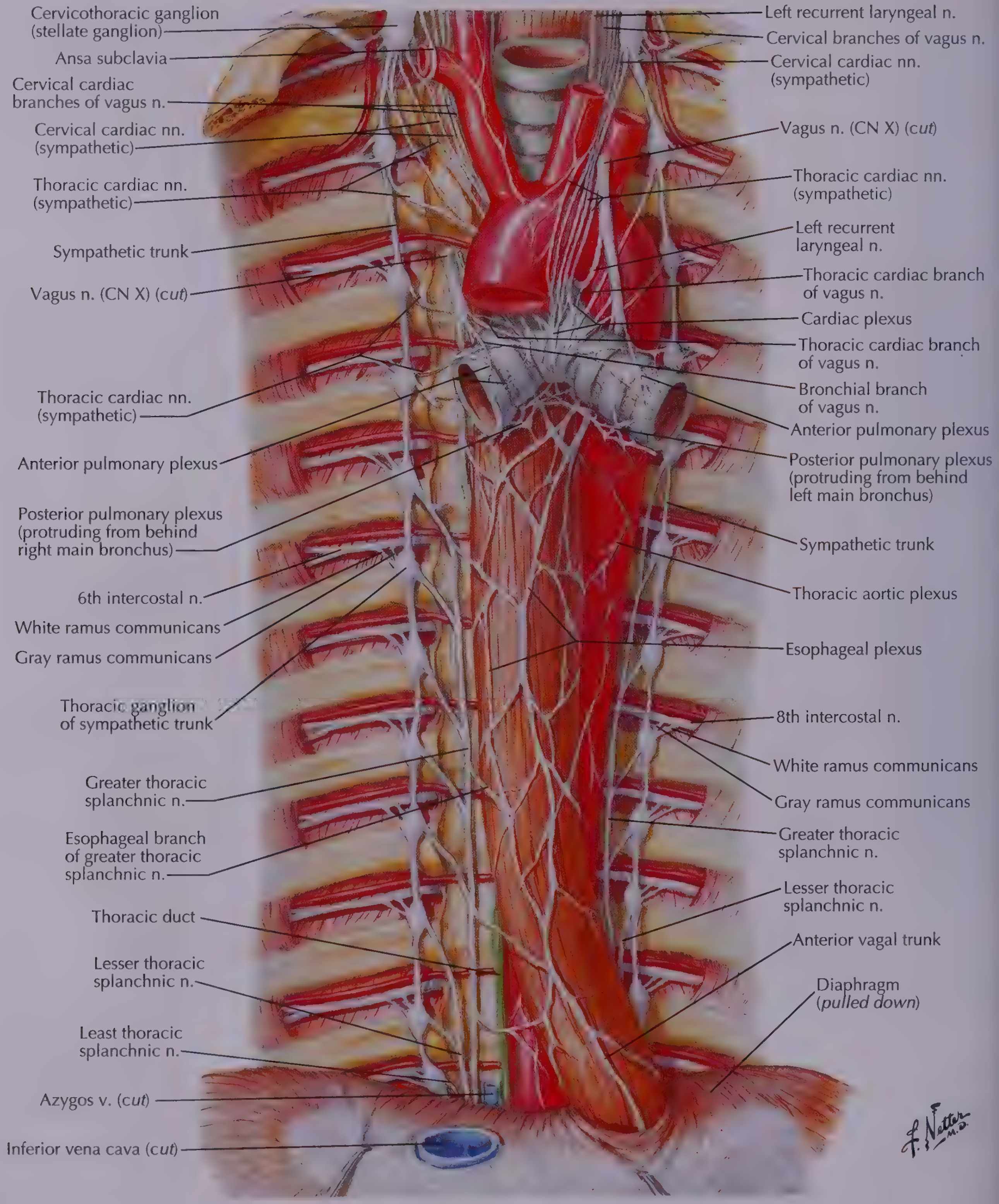
Lymphatic drainage routes

Right lung: All lobes drain to intrapulmonary and bronchopulmonary nodes, then to inferior tracheobronchial nodes, right superior tracheobronchial nodes, and right paratracheal nodes on the way to the brachiocephalic vein via the right bronchomediastinal and jugular trunks.

Left lung: The superior lobe drains to intrapulmonary and bronchopulmonary nodes, then to inferior tracheobronchial nodes, left superior tracheobronchial nodes, left paratracheal nodes and the node of the ligamentum arteriosum on the way to the brachiocephalic vein via the left bronchomediastinal trunk and thoracic duct. The intrapulmonary and bronchopulmonary nodes of the left lung also drain to right superior tracheobronchial nodes, where the lymph follows the same route as lymph from the right lung.

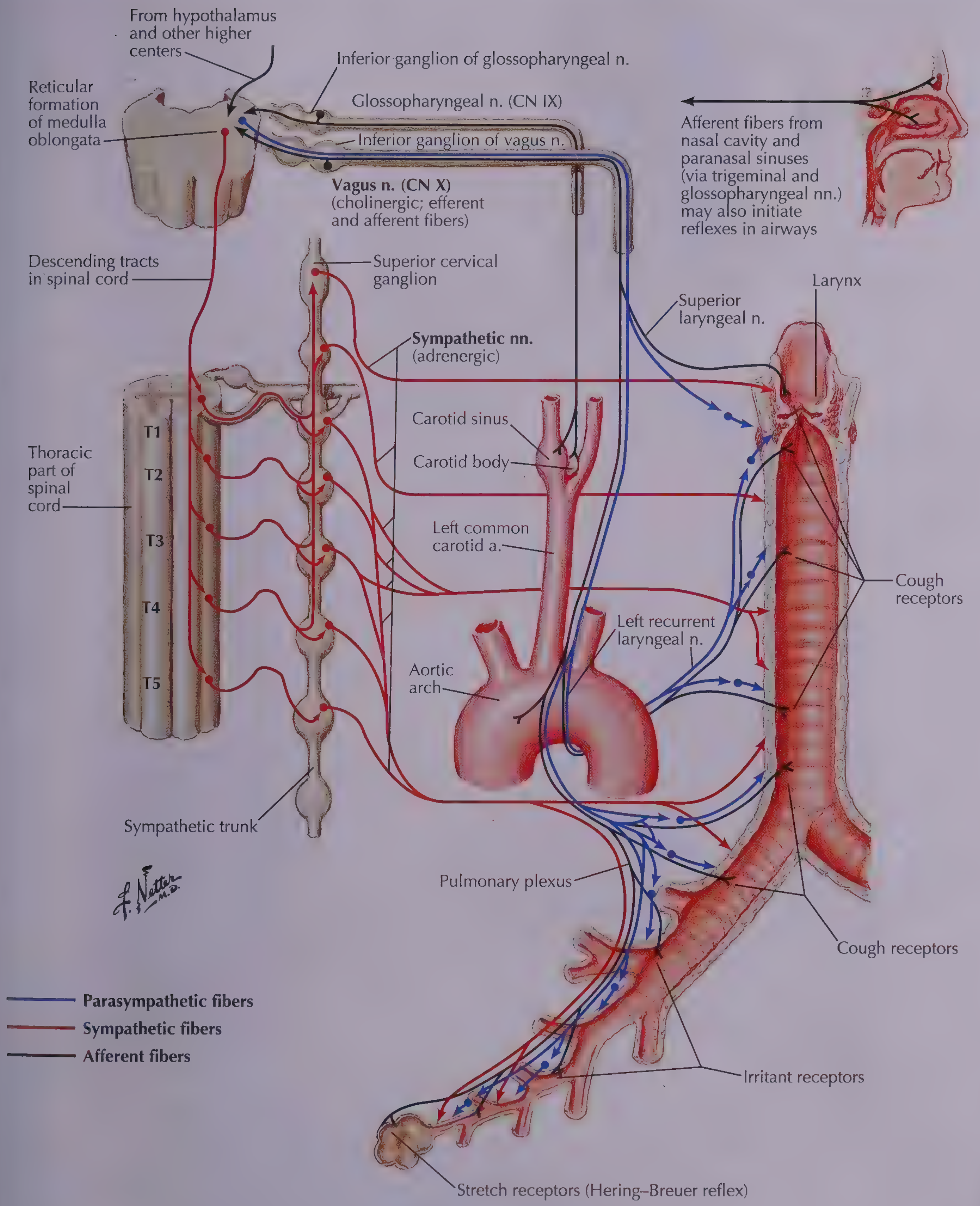
Autonomic Nerves of Thorax

See also Plates 249, BP 52

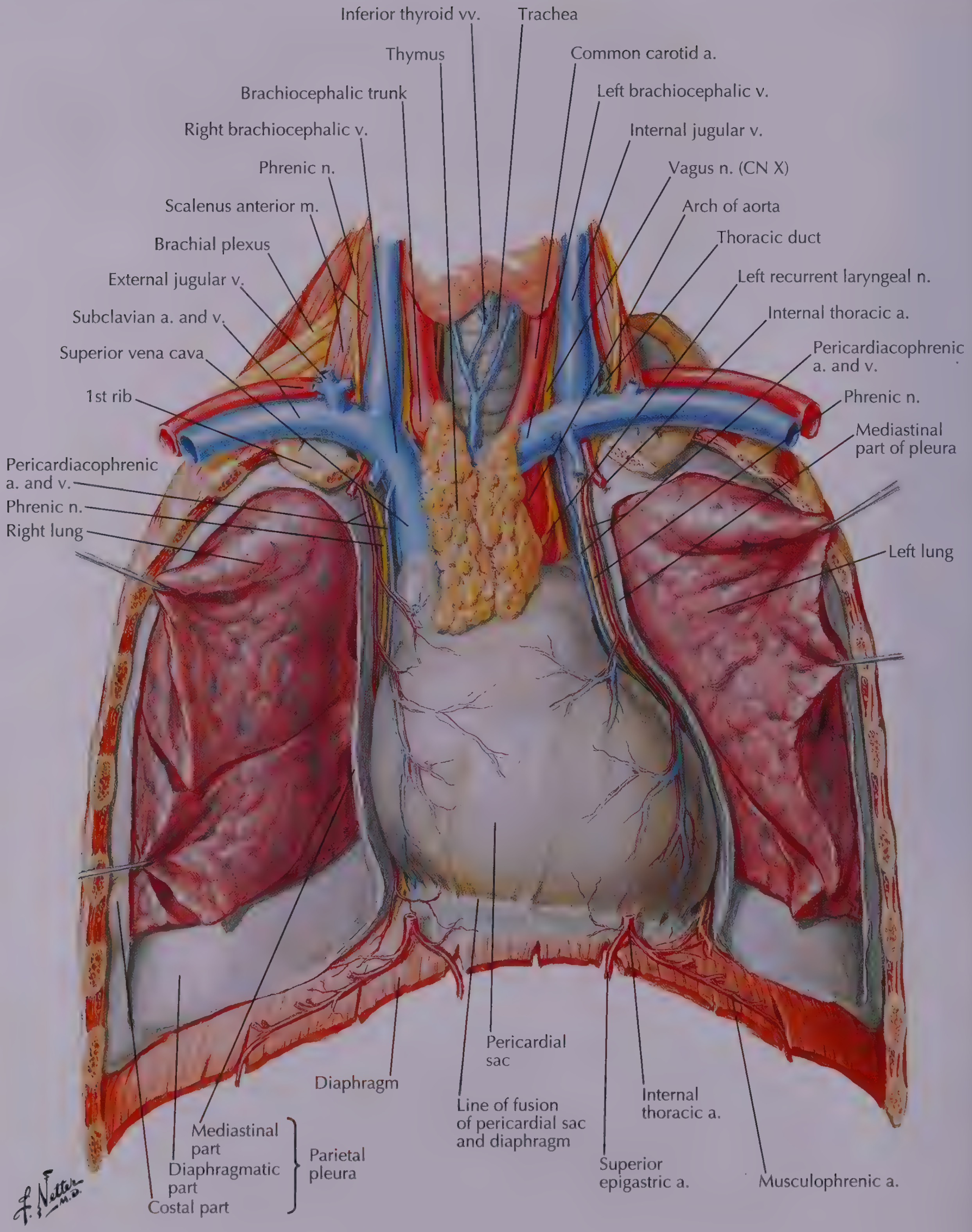

Cervicothoracic ganglion (stellate ganglion)
Ansa subclavia
Cervical cardiac branches of vagus n.
Cervical cardiac nn. (sympathetic)
Thoracic cardiac nn. (sympathetic)
Sympathetic trunk
Vagus n. (CN X) (*cut*)
Thoracic cardiac nn. (sympathetic)
Anterior pulmonary plexus
Posterior pulmonary plexus (protruding from behind right main bronchus)
6th intercostal n.
White ramus communicans
Gray ramus communicans
Thoracic ganglion of sympathetic trunk
Greater thoracic splanchnic n.
Esophageal branch of greater thoracic splanchnic n.
Thoracic duct
Lesser thoracic splanchnic n.
Least thoracic splanchnic n.
Azygos v. (*cut*)
Inferior vena cava (*cut*)
Left recurrent laryngeal n.
Cervical branches of vagus n.
Cervical cardiac nn. (sympathetic)
Vagus n. (CN X) (*cut*)
Thoracic cardiac nn. (sympathetic)
Left recurrent laryngeal n.
Thoracic cardiac branch of vagus n.
Cardiac plexus
Thoracic cardiac branch of vagus n.
Bronchial branch of vagus n.
Anterior pulmonary plexus
Posterior pulmonary plexus (protruding from behind left main bronchus)
Sympathetic trunk
Thoracic aortic plexus
Esophageal plexus
8th intercostal n.
White ramus communicans
Gray ramus communicans
Greater thoracic splanchnic n.
Lesser thoracic splanchnic n.
Anterior vagal trunk
Diaphragm (*pulled down*)

Innervation of Tracheobronchial Tree: Schema

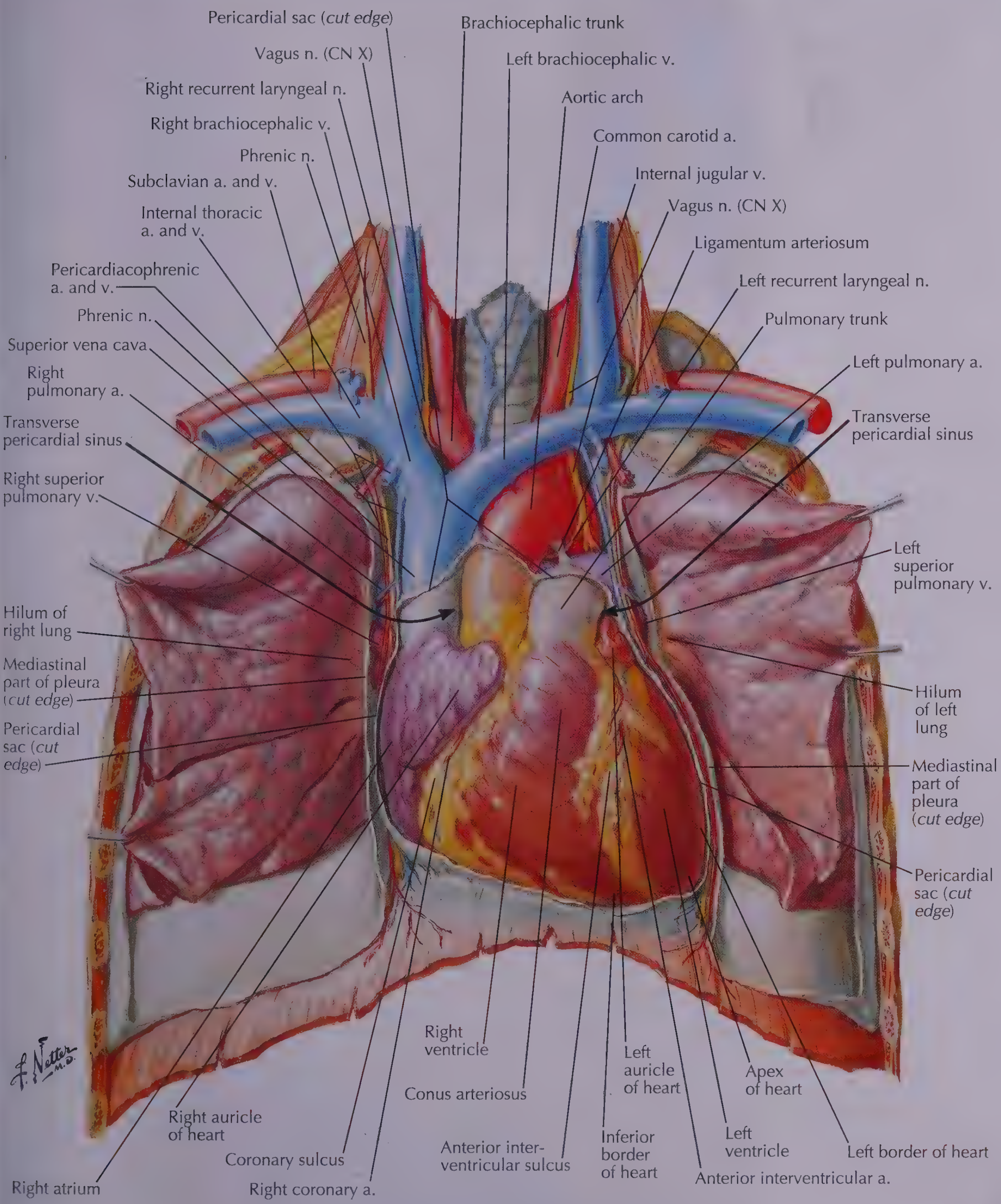
See also Plate 250


From hypothalamus and other higher centers
Reticular formation of medulla oblongata
Inferior ganglion of glossopharyngeal n.
Glossopharyngeal n. (CN IX)
Inferior ganglion of vagus n.
Vagus n. (CN X) (cholinergic; efferent and afferent fibers)
Afferent fibers from nasal cavity and paranasal sinuses (via trigeminal and glossopharyngeal nn.) may also initiate reflexes in airways
Descending tracts in spinal cord
Superior cervical ganglion
Larynx
Superior laryngeal n.
Sympathetic nn. (adrenergic)
Carotid sinus
Carotid body
T1
T2
T3
T4
T5
Thoracic part of spinal cord
Left common carotid a.
Cough receptors
Left recurrent laryngeal n.
Aortic arch
Sympathetic trunk
Pulmonary plexus
Cough receptors
Parasympathetic fibers
Sympathetic fibers
Afferent fibers
Irritant receptors
Stretch receptors (Hering–Breuer reflex)

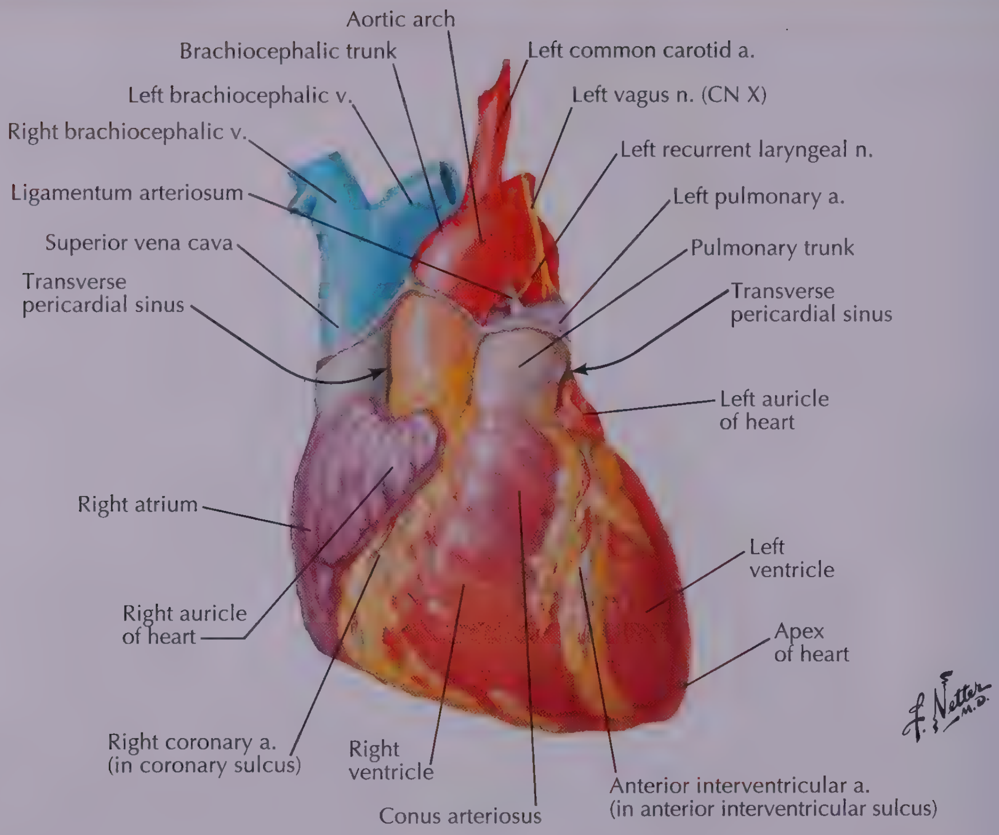
See also Plates 233, 236


Inferior thyroid vv.
Trachea
Thymus
Common carotid a.
Brachiocephalic trunk
Left brachiocephalic v.
Right brachiocephalic v.
Internal jugular v.
Phrenic n.
Vagus n. (CN X)
Scalenus anterior m.
Arch of aorta
Brachial plexus
Thoracic duct
External jugular v.
Left recurrent laryngeal n.
Subclavian a. and v.
Internal thoracic a.
Superior vena cava
Pericardiacophrenic a. and v.
1st rib
Phrenic n.
Mediastinal part of pleura
Pericardiacophrenic a. and v.
Phrenic n.
Right lung
Left lung
Pericardial sac
Diaphragm
Line of fusion of pericardial sac and diaphragm
Internal thoracic a.
Mediastinal part
Diaphragmatic part
Costal part
Parietal pleura
Superior epigastric a.
Musculophrenic a.
F. Netter M.D.

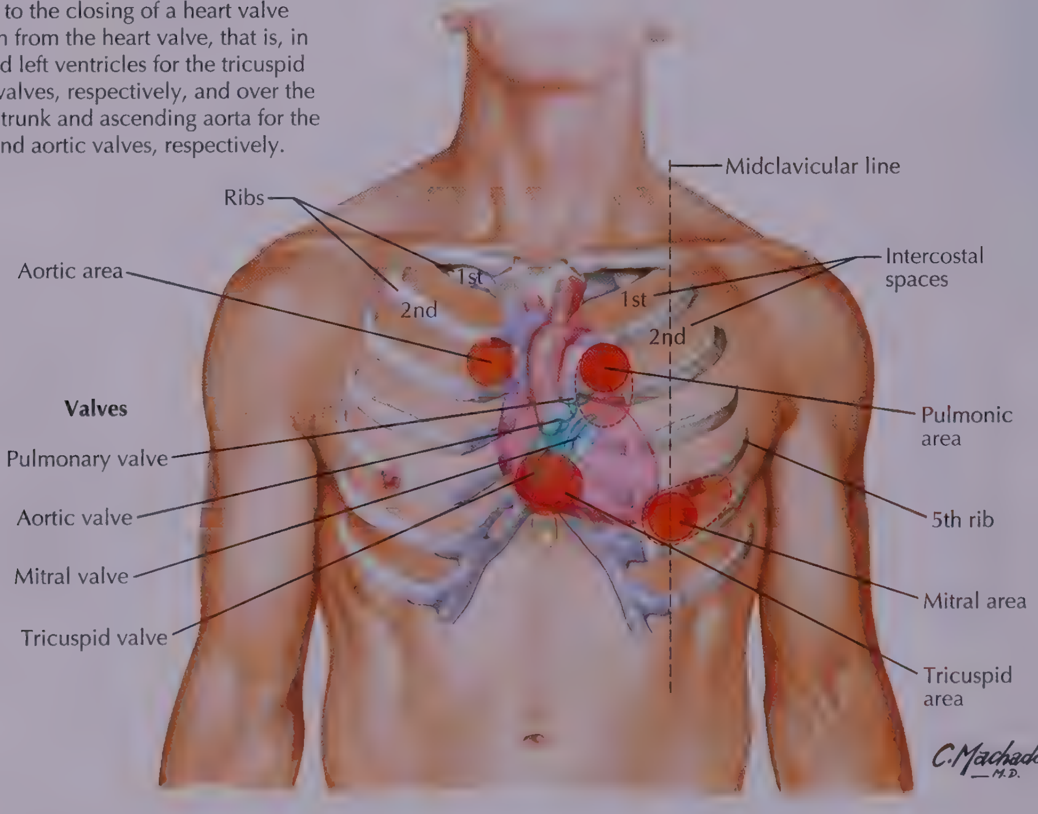
See also Plates 236, BP 51


Pericardial sac (*cut edge*)
Vagus n. (CN X)
Right recurrent laryngeal n.
Right brachiocephalic v.
Phrenic n.
Subclavian a. and v.
Internal thoracic a. and v.
Pericardiacophrenic a. and v.
Phrenic n.
Superior vena cava
Right pulmonary a.
Transverse pericardial sinus
Right superior pulmonary v.
Hilum of right lung
Mediastinal part of pleura (*cut edge*)
Pericardial sac (*cut edge*)
Brachiocephalic trunk
Left brachiocephalic v.
Aortic arch
Common carotid a.
Internal jugular v.
Vagus n. (CN X)
Ligamentum arteriosum
Left recurrent laryngeal n.
Pulmonary trunk
Left pulmonary a.
Transverse pericardial sinus
Left superior pulmonary v.
Hilum of left lung
Mediastinal part of pleura (*cut edge*)
Pericardial sac (*cut edge*)
F. Netter M.D.
Right ventricle
Conus arteriosus
Left auricle of heart
Apex of heart
Right auricle of heart
Coronary sulcus
Anterior inter-ventricular sulcus
Inferior border of heart
Left ventricle
Left border of heart
Right atrium
Right coronary a.
Anterior interventricular a.

Heart and Precordial Areas of Auscultation

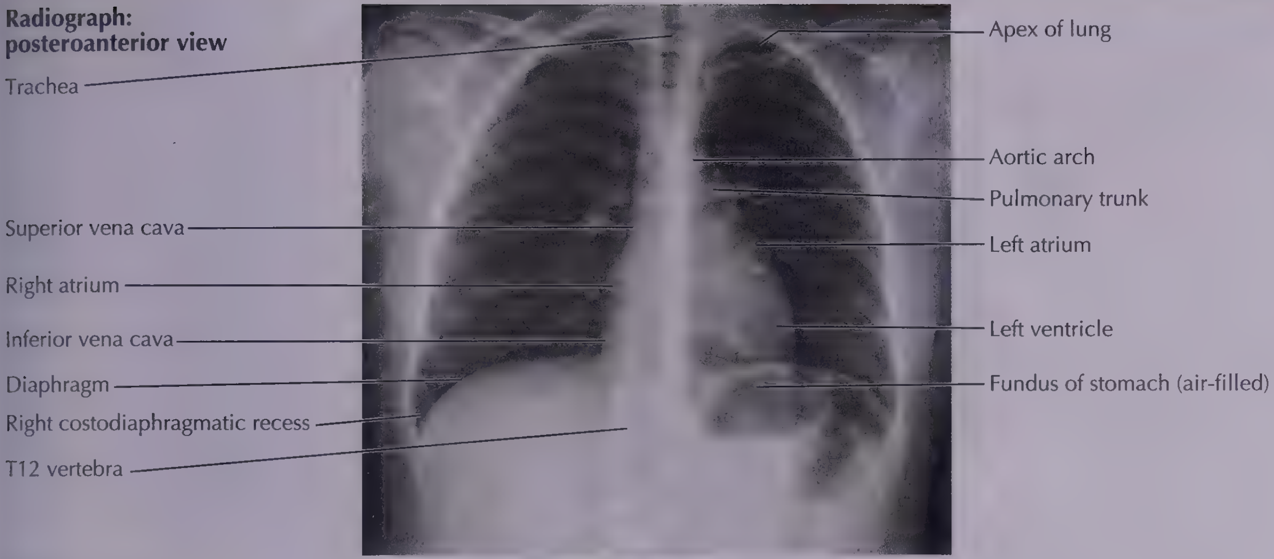

Aortic arch
Brachiocephalic trunk
Left brachiocephalic v.
Right brachiocephalic v.
Ligamentum arteriosum
Superior vena cava
Transverse pericardial sinus
Left common carotid a.
Left vagus n. (CN X)
Left recurrent laryngeal n.
Left pulmonary a.
Pulmonary trunk
Transverse pericardial sinus
Left auricle of heart
Right atrium
Left ventricle
Right auricle of heart
Apex of heart
Right coronary a. (in coronary sulcus)
Right ventricle
Conus arteriosus
Anterior interventricular a. (in anterior interventricular sulcus)

Precordial areas of auscultation:
One listens to the closing of a heart valve downstream from the heart valve, that is, in the right and left ventricles for the tricuspid and mitral valves, respectively, and over the pulmonary trunk and ascending aorta for the pulmonic and aortic valves, respectively.

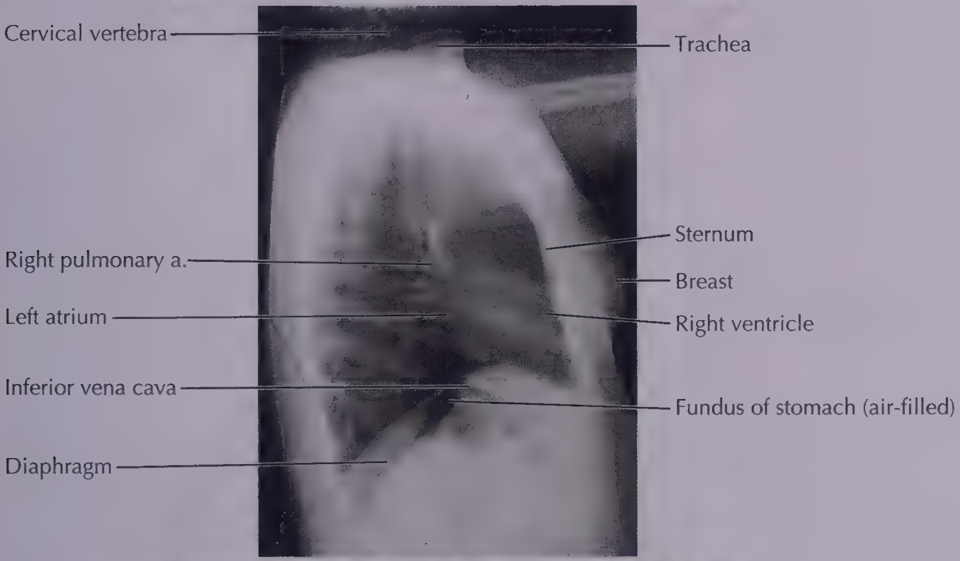

Midclavicular line
Ribs
1st
2nd
Aortic area
Intercostal spaces
1st
2nd
Valves
Pulmonary valve
Aortic valve
Mitral valve
Tricuspid valve
Pulmonic area
5th rib
Mitral area
Tricuspid area

See also Plates 233, BP 51

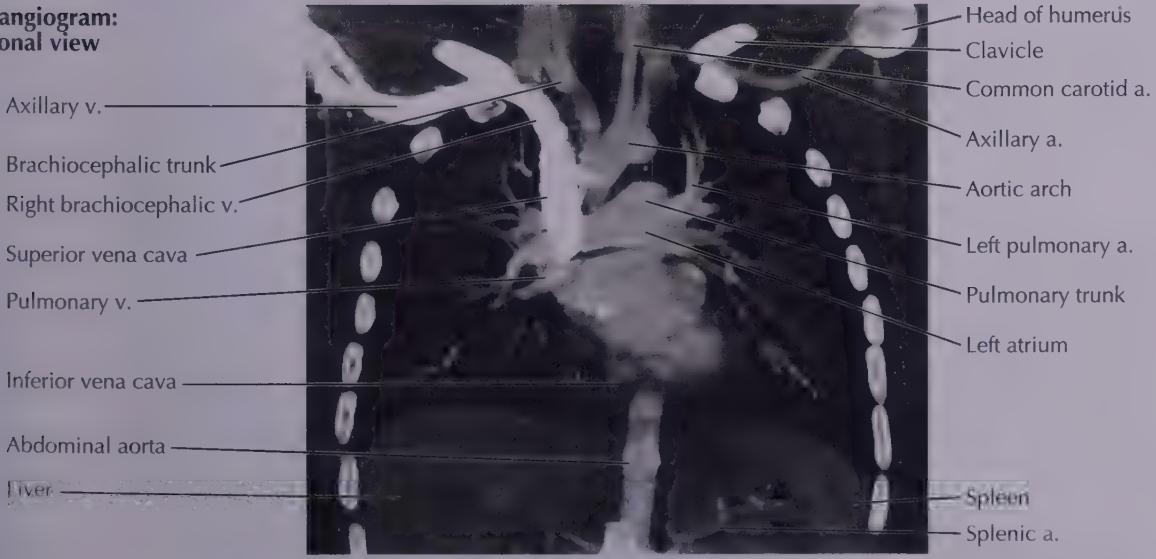
Radiograph: posteroanterior view


Trachea
Apex of lung
Aortic arch
Pulmonary trunk
Superior vena cava
Left atrium
Right atrium
Inferior vena cava
Left ventricle
Diaphragm
Fundus of stomach (air-filled)
Right costodiaphragmatic recess
T12 vertebra

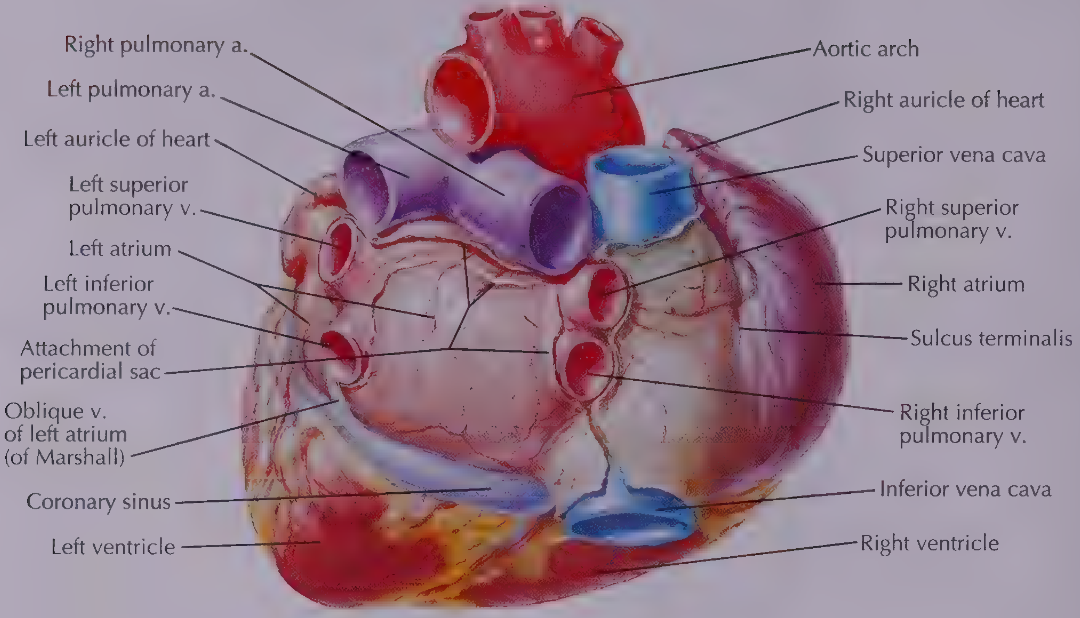
Radiograph: lateral view


Cervical vertebra
Trachea
Sternum
Right pulmonary a.
Breast
Left atrium
Right ventricle
Inferior vena cava
Fundus of stomach (air-filled)
Diaphragm

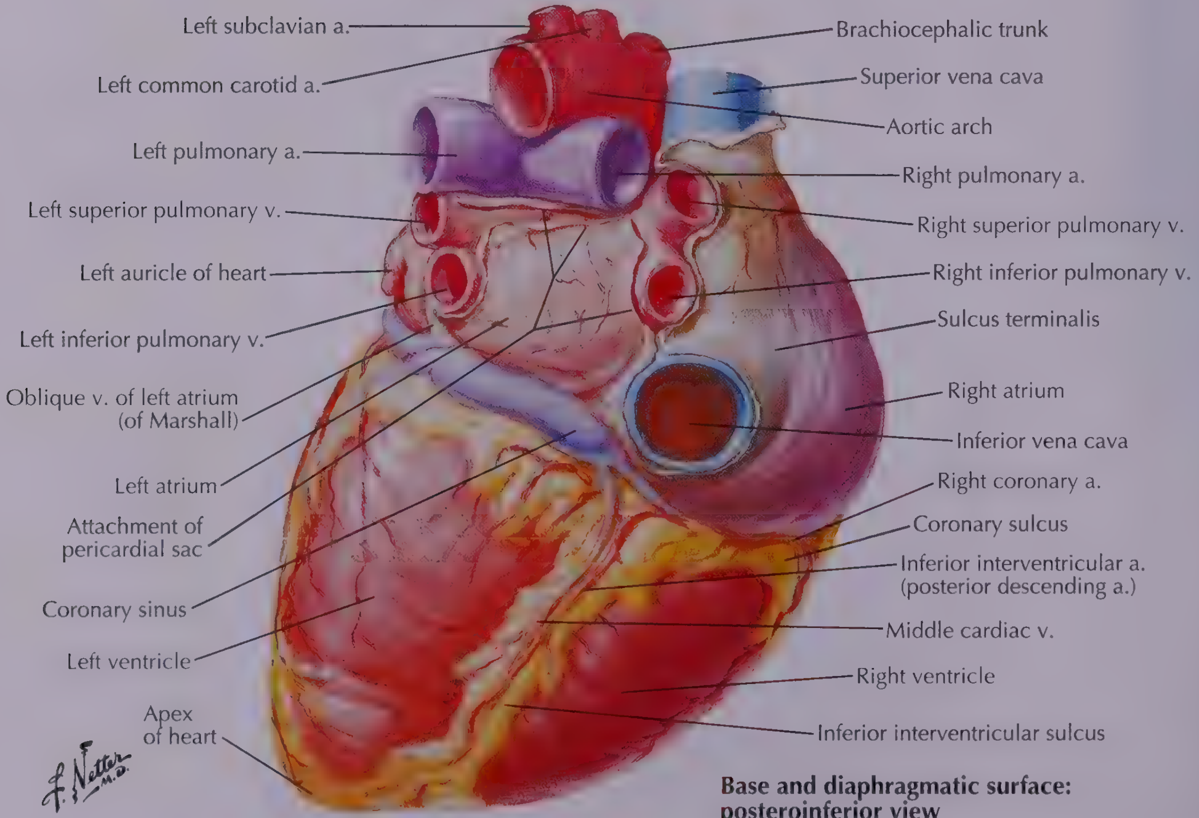
CT angiogram: coronal view


Head of humerus
Clavicle
Common carotid a.
Axillary v.
Axillary a.
Brachiocephalic trunk
Aortic arch
Right brachiocephalic v.
Left pulmonary a.
Superior vena cava
Pulmonary trunk
Pulmonary v.
Left atrium
Inferior vena cava
Abdominal aorta
Liver
Spleen
Splenic a.

Heart: Base and Diaphragmatic Surface


Right pulmonary a.
Left pulmonary a.
Left auricle of heart
Left superior pulmonary v.
Left atrium
Left inferior pulmonary v.
Attachment of pericardial sac
Oblique v. of left atrium (of Marshall)
Coronary sinus
Left ventricle
Aortic arch
Right auricle of heart
Superior vena cava
Right superior pulmonary v.
Right atrium
Sulcus terminalis
Right inferior pulmonary v.
Inferior vena cava
Right ventricle

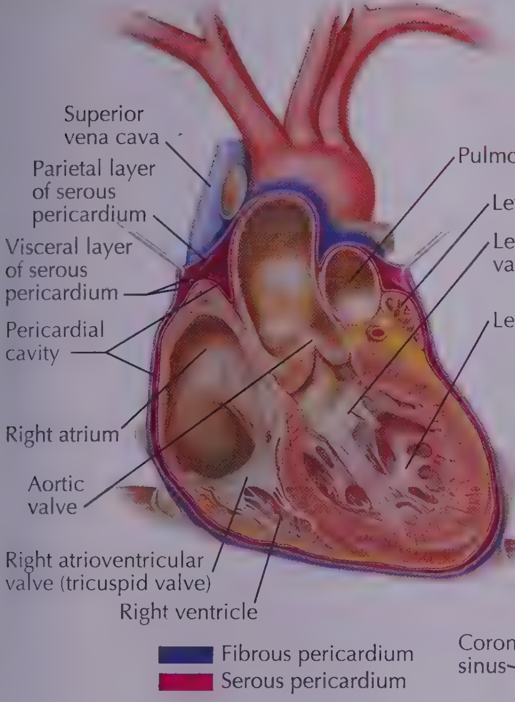
Base of heart: posterior view


Left subclavian a.
Left common carotid a.
Left pulmonary a.
Left superior pulmonary v.
Left auricle of heart
Left inferior pulmonary v.
Oblique v. of left atrium (of Marshall)
Left atrium
Attachment of pericardial sac
Coronary sinus
Left ventricle
Apex of heart
F. Netter M.D.
Brachiocephalic trunk
Superior vena cava
Aortic arch
Right pulmonary a.
Right superior pulmonary v.
Right inferior pulmonary v.
Sulcus terminalis
Right atrium
Inferior vena cava
Right coronary a.
Coronary sulcus
Inferior interventricular a. (posterior descending a.)
Middle cardiac v.
Right ventricle
Inferior interventricular sulcus

Base and diaphragmatic surface: posteroinferior view

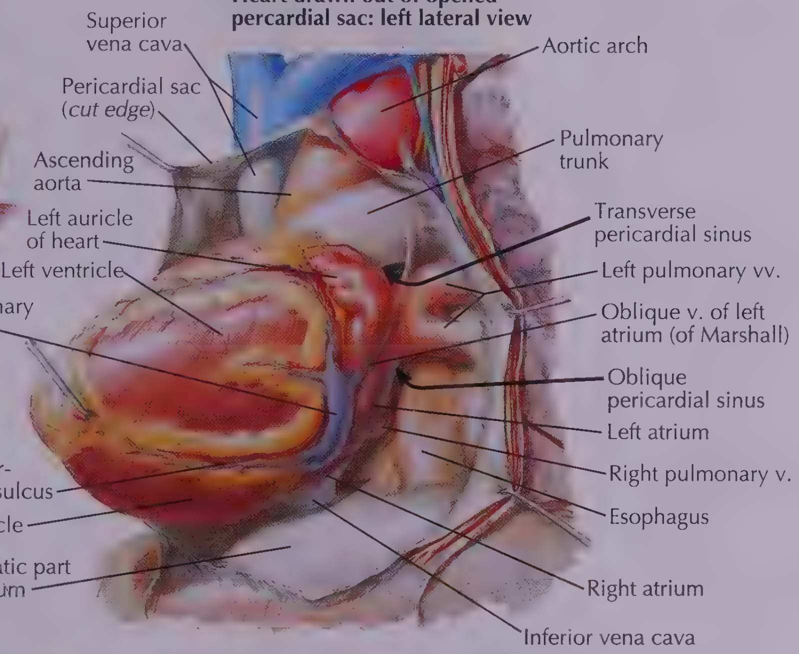
See also Plates 231, 232

Coronal view

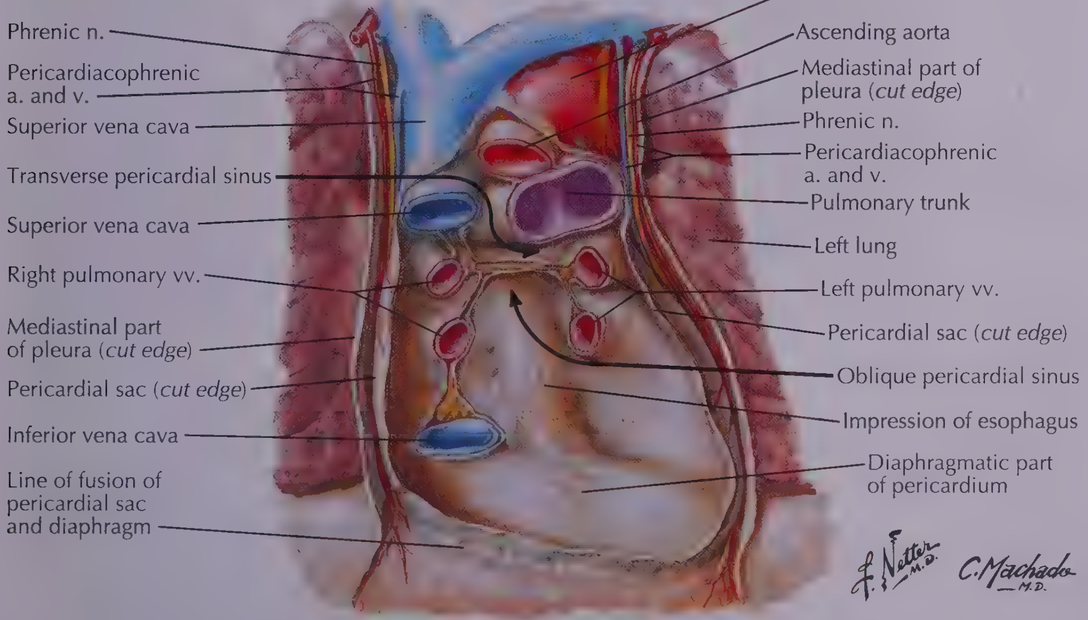

Superior vena cava
Parietal layer of serous pericardium
Visceral layer of serous pericardium
Pericardial cavity
Right atrium
Aortic valve
Right atrioventricular valve (tricuspid valve)
Right ventricle
Pulmonary trunk
Left auricle of heart
Left atrioventricular valve (mitral valve)
Left ventricle
Fibrous pericardium
Serous pericardium

🟦	Fibrous pericardium
🟥	Serous pericardium

Heart drawn out of opened percardial sac: left lateral view

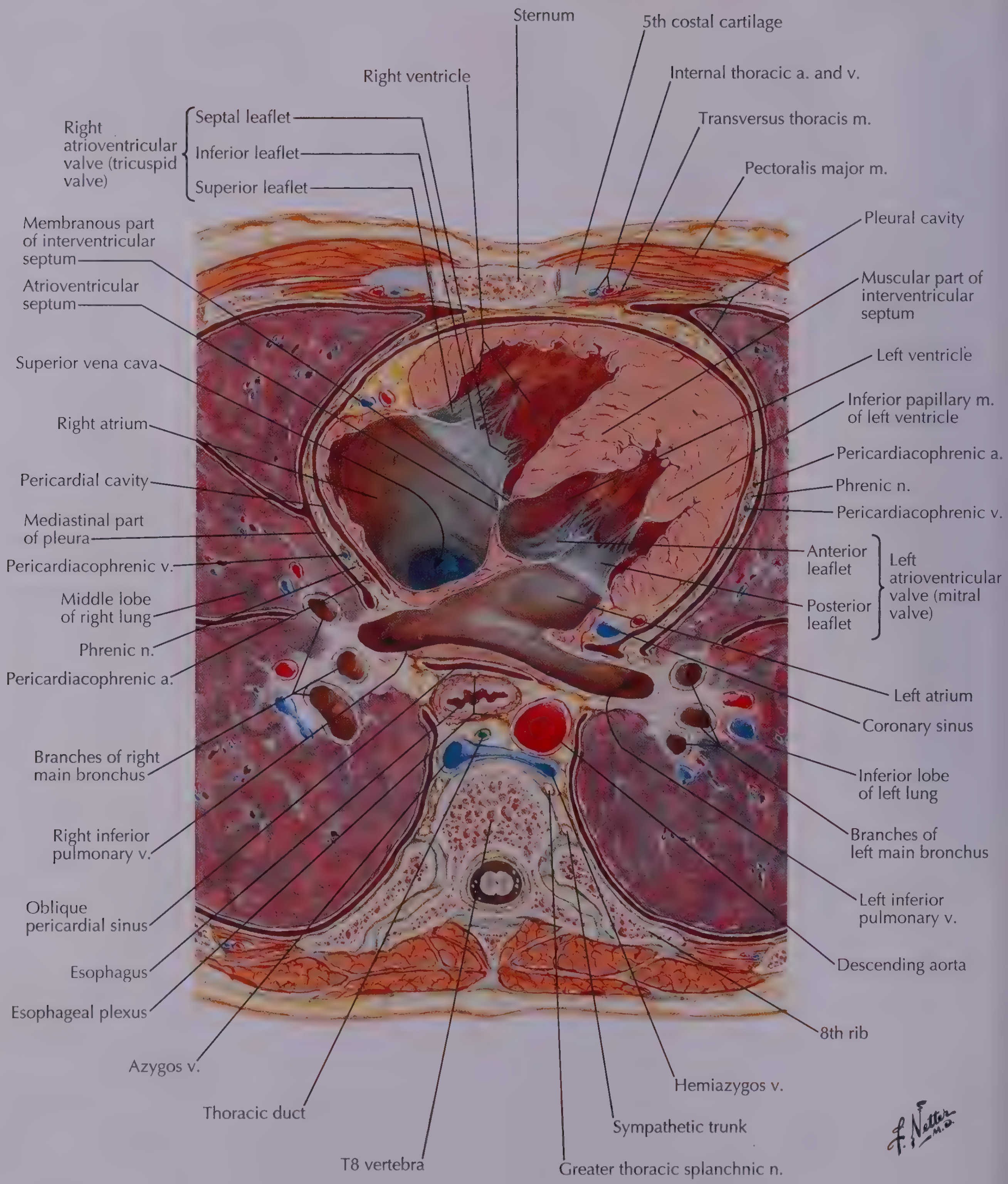

Superior vena cava
Pericardial sac (cut edge)
Ascending aorta
Left auricle of heart
Left ventricle
Coronary sinus
Inferior interventricular sulcus
Right ventricle
Diaphragmatic part of pericardium
Aortic arch
Pulmonary trunk
Transverse pericardial sinus
Left pulmonary vv.
Oblique v. of left atrium (of Marshall)
Oblique pericardial sinus
Left atrium
Right pulmonary v.
Esophagus
Right atrium
Inferior vena cava

Percardial sac with heart removed: anterior view


Phrenic n.
Pericardiacophrenic a. and v.
Superior vena cava
Transverse pericardial sinus
Superior vena cava
Right pulmonary vv.
Mediastinal part of pleura (cut edge)
Pericardial sac (cut edge)
Inferior vena cava
Line of fusion of pericardial sac and diaphragm
Aortic arch
Ascending aorta
Mediastinal part of pleura (cut edge)
Phrenic n.
Pericardiacophrenic a. and v.
Pulmonary trunk
Left lung
Left pulmonary vv.
Pericardial sac (cut edge)
Oblique pericardial sinus
Impression of esophagus
Diaphragmatic part of pericardium

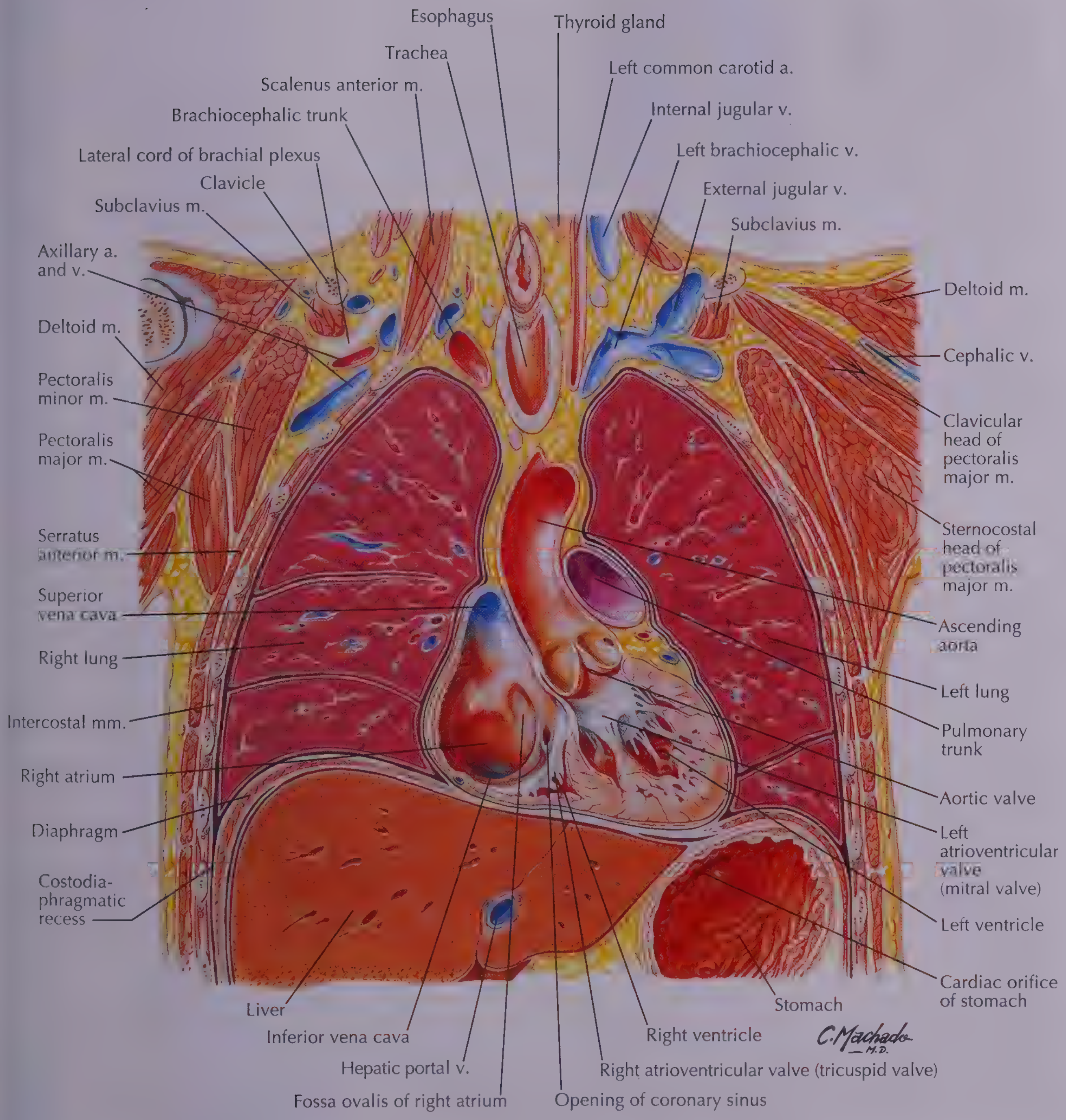
F. Netter M.D. C. Machado M.D.

Mediastinum: Cross Section


Sternum
5th costal cartilage
Right ventricle
Internal thoracic a. and v.
Transversus thoracis m.
Pectoralis major m.
Right atrioventricular valve (tricuspid valve)
Septal leaflet
Inferior leaflet
Superior leaflet
Pleural cavity
Membranous part of interventricular septum
Muscular part of interventricular septum
Atrioventricular septum
Left ventricle
Superior vena cava
Inferior papillary m. of left ventricle
Right atrium
Pericardiacophrenic a.
Pericardial cavity
Phrenic n.
Pericardiacophrenic v.
Mediastinal part of pleura
Anterior leaflet
Left atrioventricular valve (mitral valve)
Posterior leaflet
Pericardiacophrenic v.
Middle lobe of right lung
Phrenic n.
Pericardiacophrenic a.
Left atrium
Coronary sinus
Branches of right main bronchus
Inferior lobe of left lung
Branches of left main bronchus
Right inferior pulmonary v.
Left inferior pulmonary v.
Oblique pericardial sinus
Descending aorta
Esophagus
Esophageal plexus
8th rib
Azygos v.
Hemiazygos v.
Thoracic duct
Sympathetic trunk
T8 vertebra
Greater thoracic splanchnic n.
F. Netter M.D.

Thorax: Coronal Section of Heart and Ascending Aorta

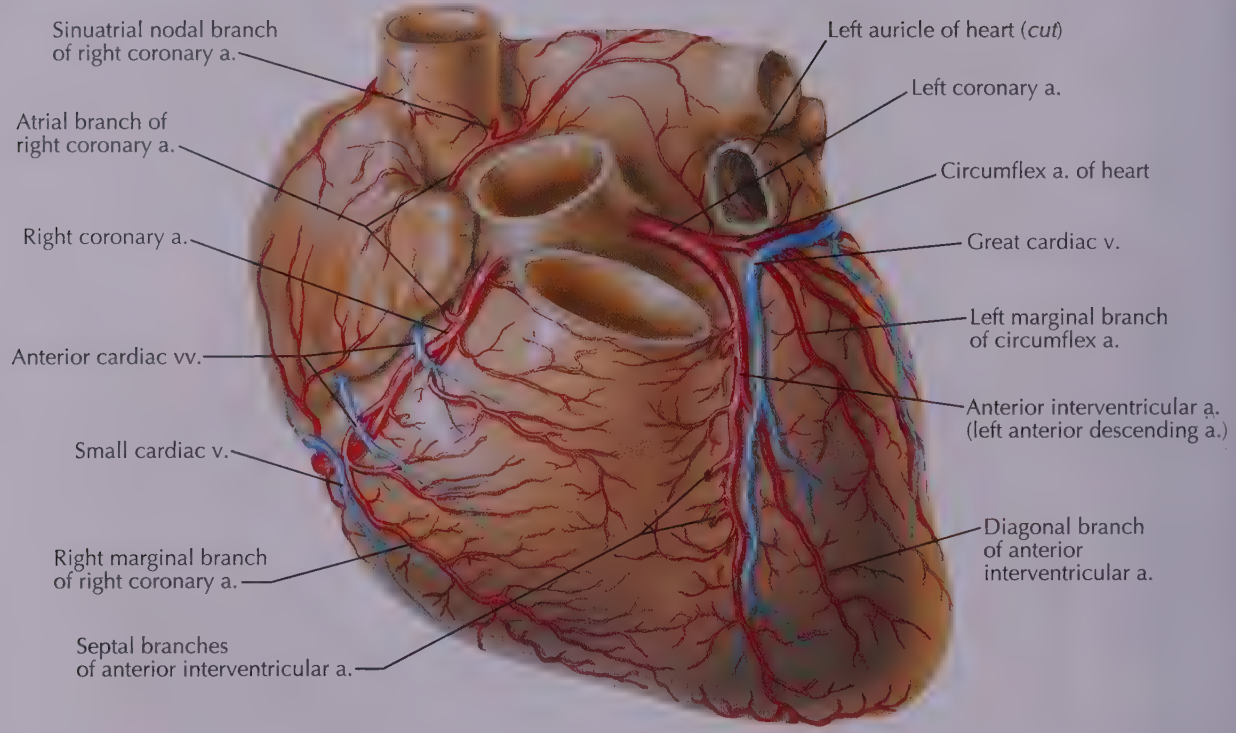
See also Plate BP 50


Esophagus
Thyroid gland
Trachea
Left common carotid a.
Scalenus anterior m.
Internal jugular v.
Brachiocephalic trunk
Left brachiocephalic v.
Lateral cord of brachial plexus
External jugular v.
Clavicle
Subclavius m.
Subclavius m.
Axillary a. and v.
Deltoid m.
Deltoid m.
Cephalic v.
Pectoralis minor m.
Clavicular head of pectoralis major m.
Pectoralis major m.
Serratus anterior m.
Sternocostal head of pectoralis major m.
Superior vena cava
Ascending aorta
Right lung
Left lung
Intercostal mm.
Pulmonary trunk
Right atrium
Aortic valve
Diaphragm
Left atrioventricular valve (mitral valve)
Costodiaphragmatic recess
Left ventricle
Cardiac orifice of stomach
Liver
Stomach
Inferior vena cava
Right ventricle
C.Machado M.D.
Hepatic portal v.
Right atrioventricular valve (tricuspid valve)
Fossa ovalis of right atrium
Opening of coronary sinus

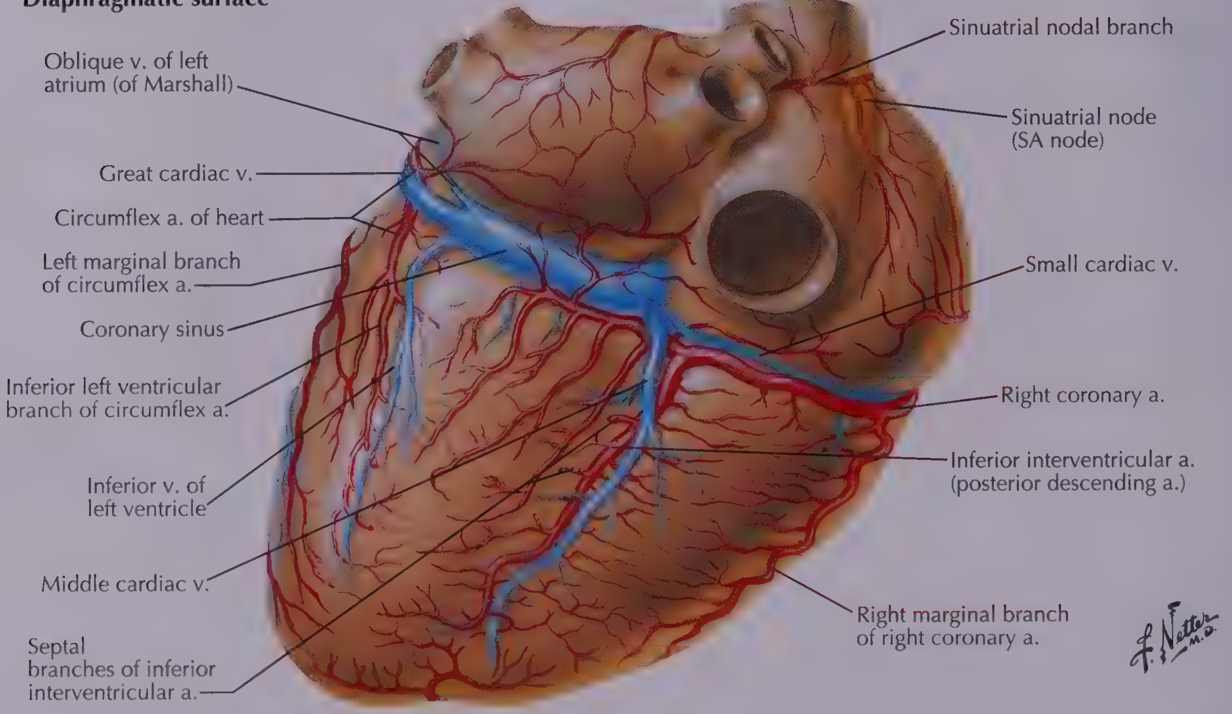
Coronary Arteries and Cardiac Veins

See also Plate BP 47

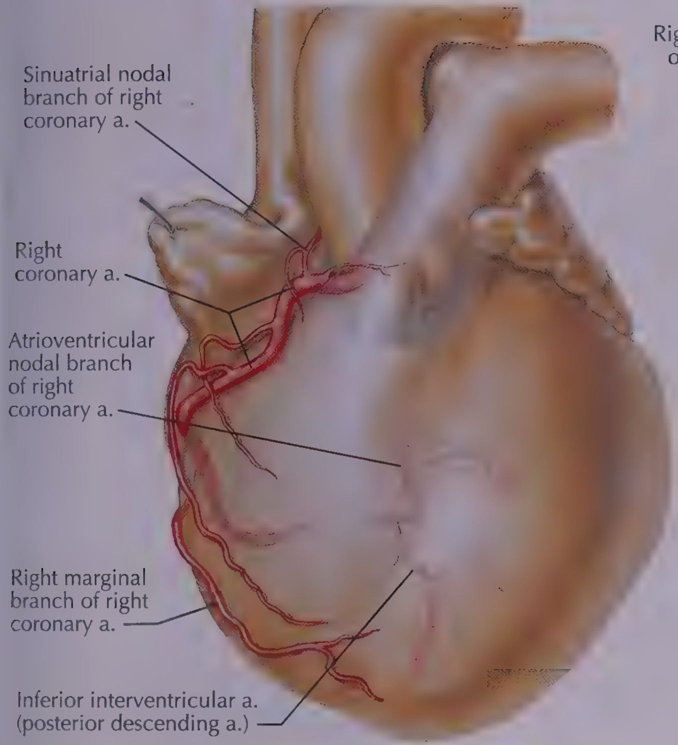
Sternocostal surface

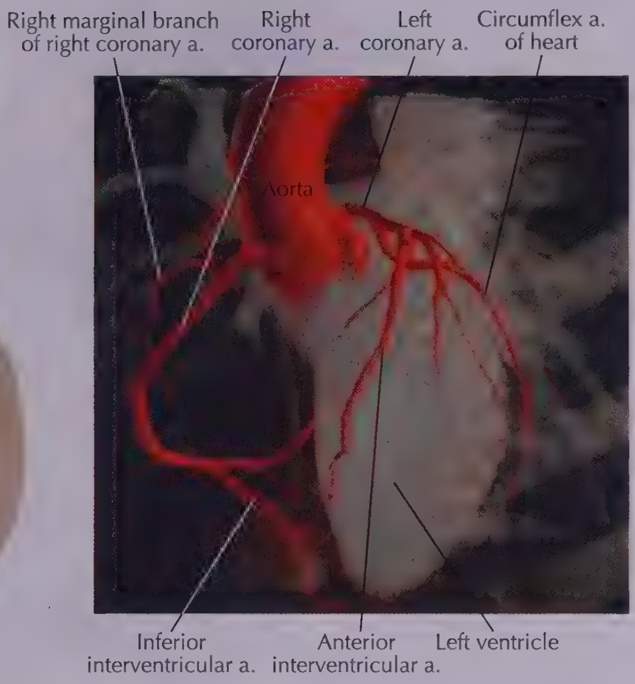

Sinuatrial nodal branch of right coronary a.
Atrial branch of right coronary a.
Right coronary a.
Anterior cardiac vv.
Small cardiac v.
Right marginal branch of right coronary a.
Septal branches of anterior interventricular a.
Left auricle of heart (*cut*)
Left coronary a.
Circumflex a. of heart
Great cardiac v.
Left marginal branch of circumflex a.
Anterior interventricular a. (left anterior descending a.)
Diagonal branch of anterior interventricular a.

Diaphragmatic surface


Oblique v. of left atrium (of Marshall)
Great cardiac v.
Circumflex a. of heart
Left marginal branch of circumflex a.
Coronary sinus
Inferior left ventricular branch of circumflex a.
Inferior v. of left ventricle
Middle cardiac v.
Septal branches of inferior interventricular a.
Sinuatrial nodal branch
Sinuatrial node (SA node)
Small cardiac v.
Right coronary a.
Inferior interventricular a. (posterior descending a.)
Right marginal branch of right coronary a.

See also Plate BP 46


Sinuatrial nodal branch of right coronary a.
Right coronary a.
Atrioventricular nodal branch of right coronary a.
Right marginal branch of right coronary a.
Inferior interventricular a. (posterior descending a.)


Right marginal branch of right coronary a.
Right coronary a.
Left coronary a.
Circumflex a. of heart
Aorta
Inferior interventricular a.
Anterior interventricular a.
Left ventricle

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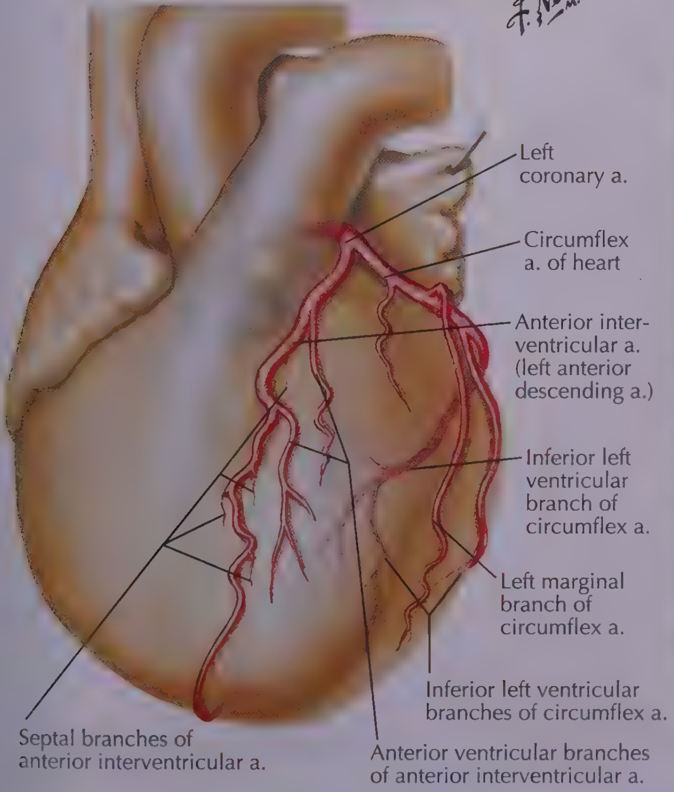
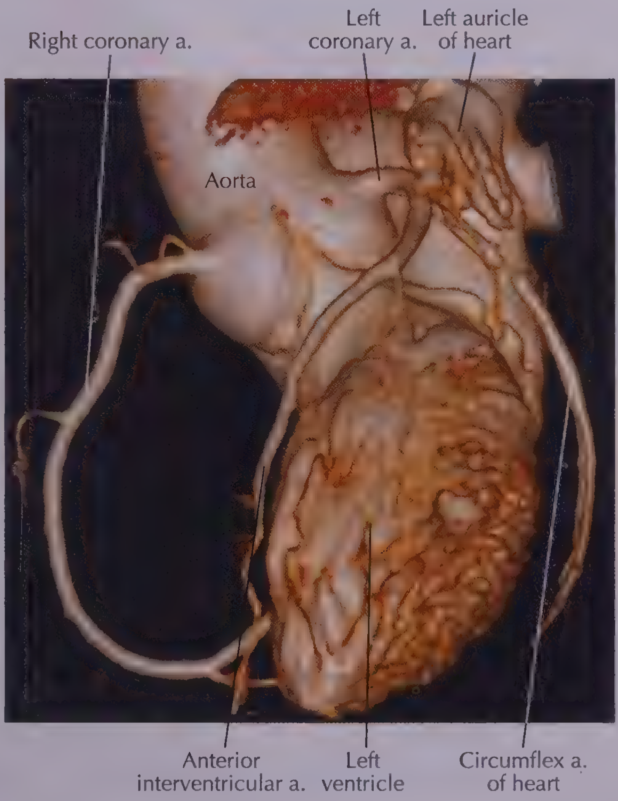
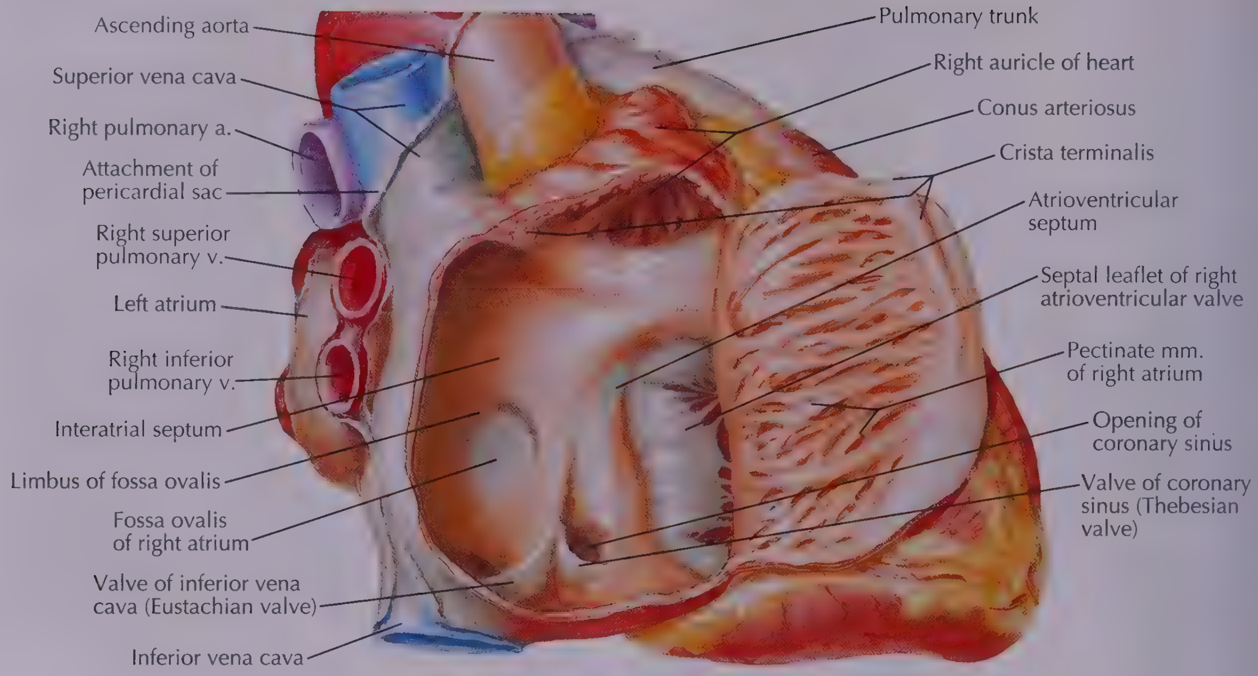
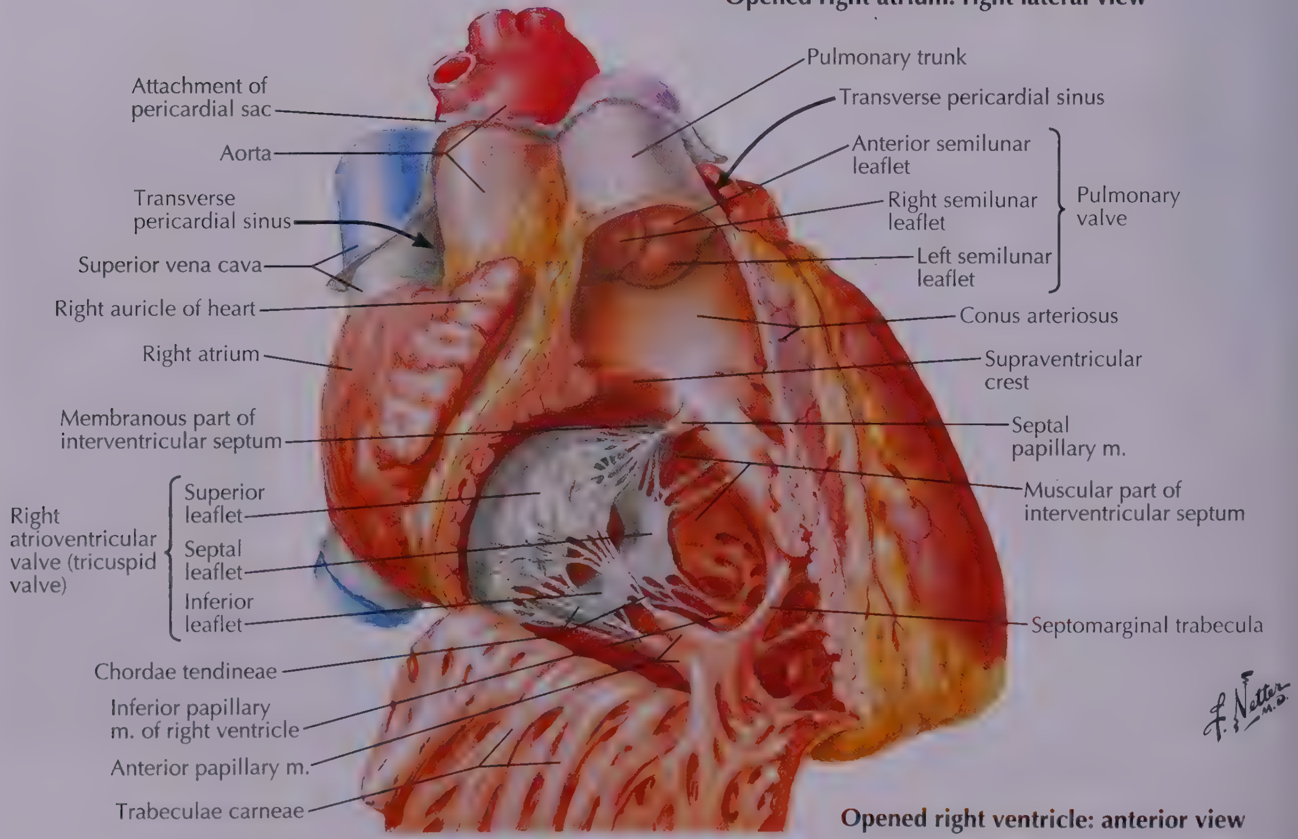

Left coronary a.
Circumflex a. of heart
Anterior interventricular a. (left anterior descending a.)
Inferior left ventricular branch of circumflex a.
Left marginal branch of circumflex a.
Inferior left ventricular branches of circumflex a.
Septal branches of anterior interventricular a.
Anterior ventricular branches of anterior interventricular a.


Right coronary a.
Left coronary a.
Left auricle of heart
Aorta
Anterior interventricular a.
Left ventricle
Circumflex a. of heart

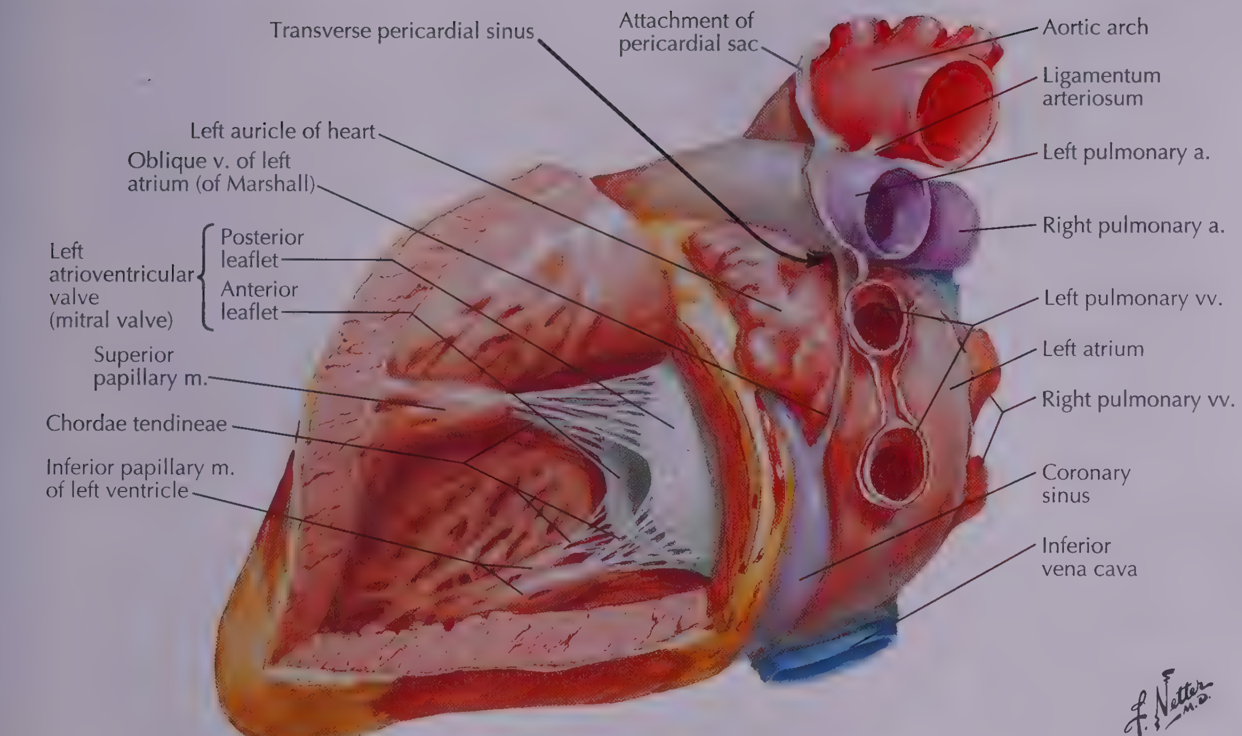
See also Plate 246


Ascending aorta
Superior vena cava
Right pulmonary a.
Attachment of pericardial sac
Right superior pulmonary v.
Left atrium
Right inferior pulmonary v.
Interatrial septum
Limbus of fossa ovalis
Fossa ovalis of right atrium
Valve of inferior vena cava (Eustachian valve)
Inferior vena cava
Pulmonary trunk
Right auricle of heart
Conus arteriosus
Crista terminalis
Atrioventricular septum
Septal leaflet of right atrioventricular valve
Pectinate mm. of right atrium
Opening of coronary sinus
Valve of coronary sinus (Thebesian valve)

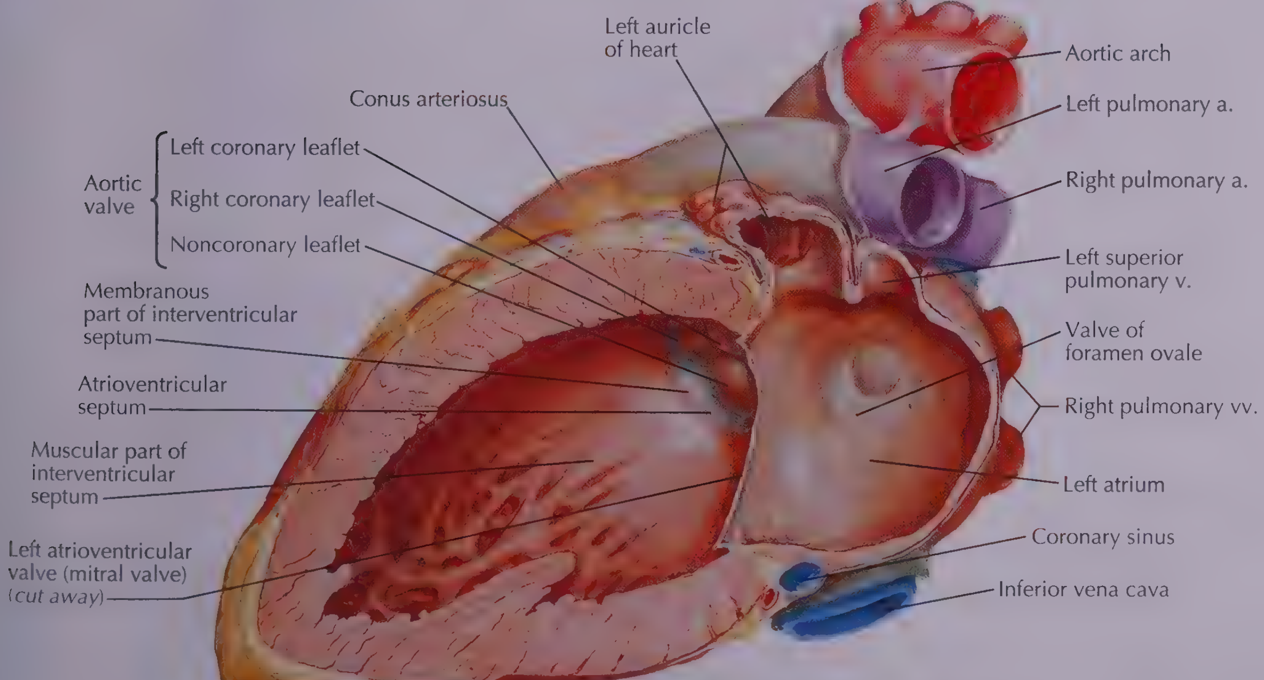
Opened right atrium: right lateral view


Attachment of pericardial sac
Aorta
Transverse pericardial sinus
Superior vena cava
Right auricle of heart
Right atrium
Membranous part of interventricular septum
Right atrioventricular valve (tricuspid valve)
Superior leaflet
Septal leaflet
Inferior leaflet
Chordae tendineae
Inferior papillary m. of right ventricle
Anterior papillary m.
Trabeculae carneae
Pulmonary trunk
Transverse pericardial sinus
Anterior semilunar leaflet
Right semilunar leaflet
Left semilunar leaflet
Pulmonary valve
Conus arteriosus
Supraventricular crest
Septal papillary m.
Muscular part of interventricular septum
Septomarginal trabecula
F. Netter M.D.

Opened right ventricle: anterior view

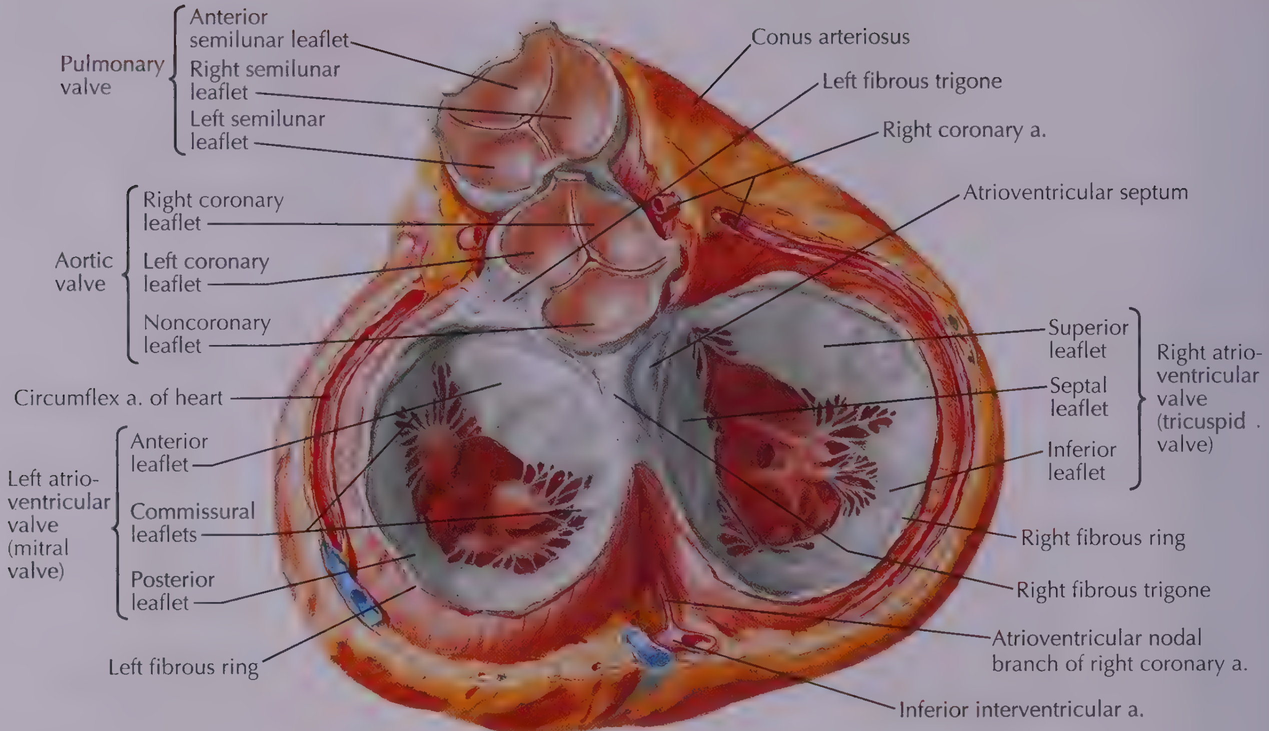

Transverse pericardial sinus
Attachment of pericardial sac
Aortic arch
Ligamentum arteriosum
Left pulmonary a.
Right pulmonary a.
Left auricle of heart
Oblique v. of left atrium (of Marshall)
Left atrioventricular valve (mitral valve)
Posterior leaflet
Anterior leaflet
Left pulmonary vv.
Left atrium
Superior papillary m.
Right pulmonary vv.
Chordae tendineae
Inferior papillary m. of left ventricle
Coronary sinus
Inferior vena cava
F. Netter M.D.

Flap opened in inferolateral wall of left ventricle

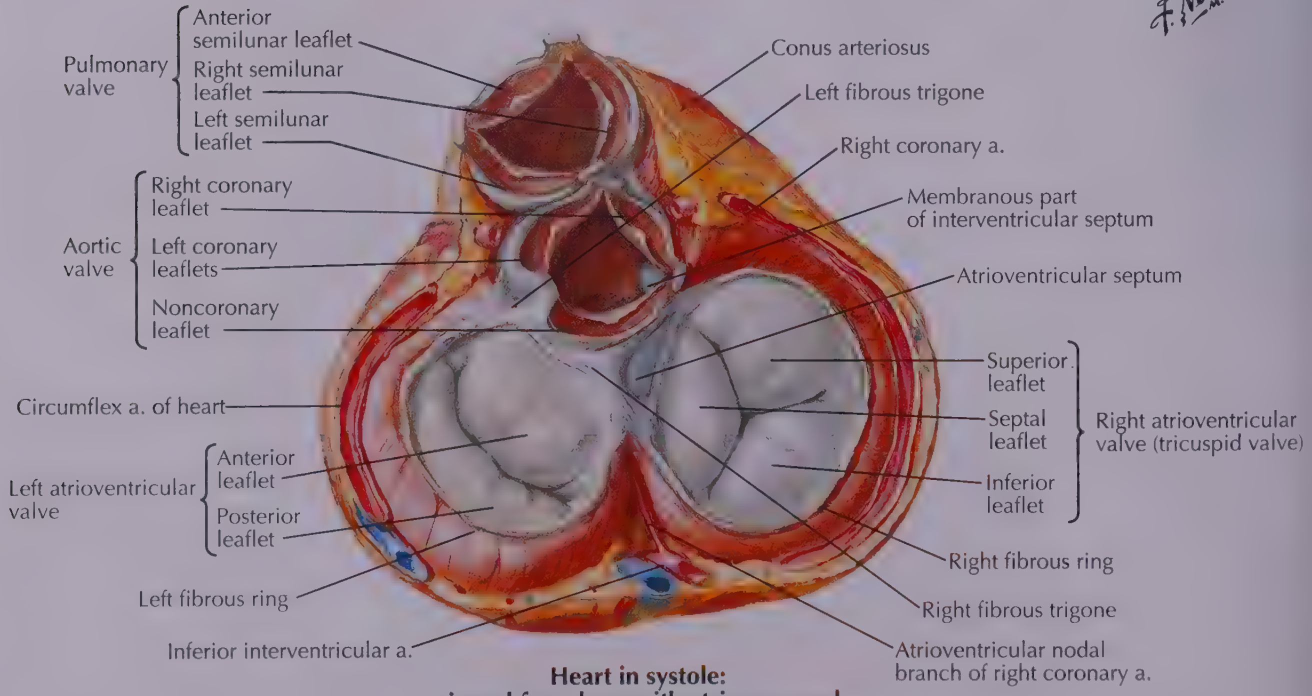

Left auricle of heart
Aortic arch
Conus arteriosus
Left pulmonary a.
Aortic valve
Left coronary leaflet
Right coronary leaflet
Right pulmonary a.
Noncoronary leaflet
Left superior pulmonary v.
Membranous part of interventricular septum
Valve of foramen ovale
Atrioventricular septum
Right pulmonary vv.
Muscular part of interventricular septum
Left atrium
Coronary sinus
Left atrioventricular valve (mitral valve) (cut away)
Inferior vena cava

Section through left atrium and ventricle with left atrioventricular (mitral) valve cut away

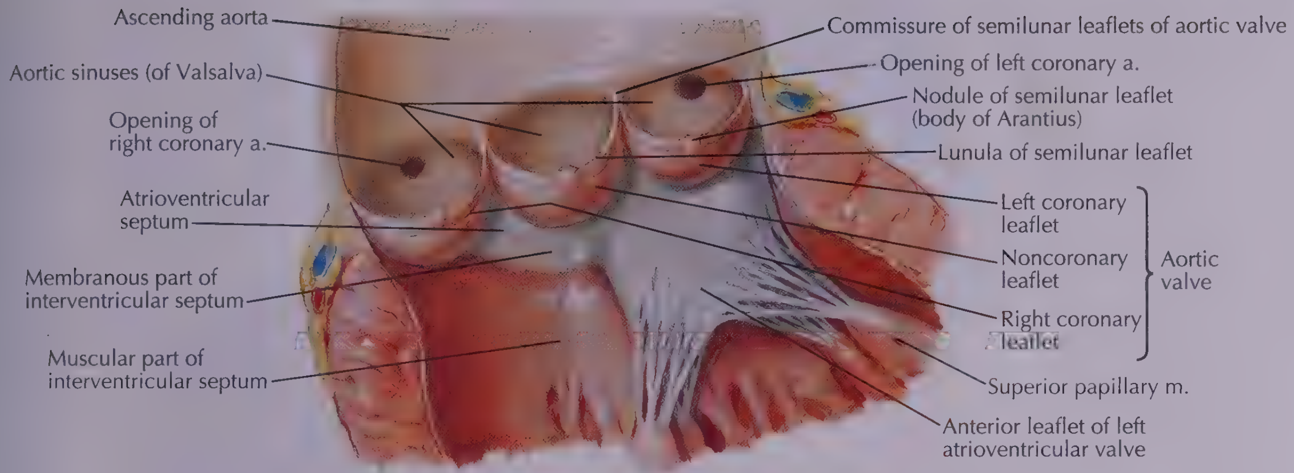
Valvular Complex of Heart


Pulmonary valve
Anterior semilunar leaflet
Right semilunar leaflet
Left semilunar leaflet
Aortic valve
Right coronary leaflet
Left coronary leaflet
Noncoronary leaflet
Circumflex a. of heart
Left atrioventricular valve (mitral valve)
Anterior leaflet
Commissural leaflets
Posterior leaflet
Left fibrous ring
Conus arteriosus
Left fibrous trigone
Right coronary a.
Atrioventricular septum
Right atrioventricular valve (tricuspid valve)
Superior leaflet
Septal leaflet
Inferior leaflet
Right fibrous ring
Right fibrous trigone
Atrioventricular nodal branch of right coronary a.
Inferior interventricular a.

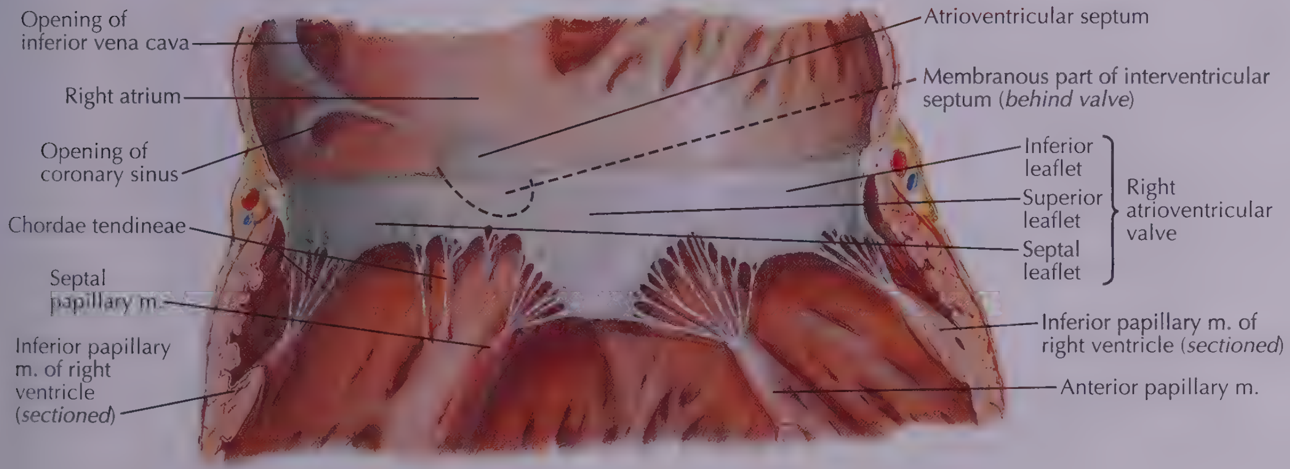
Heart in diastole:
viewed from base with atria removed


Pulmonary valve
Anterior semilunar leaflet
Right semilunar leaflet
Left semilunar leaflet
Aortic valve
Right coronary leaflet
Left coronary leaflets
Noncoronary leaflet
Circumflex a. of heart
Left atrioventricular valve
Anterior leaflet
Posterior leaflet
Left fibrous ring
Inferior interventricular a.
Conus arteriosus
Left fibrous trigone
Right coronary a.
Membranous part of interventricular septum
Atrioventricular septum
Right atrioventricular valve (tricuspid valve)
Superior leaflet
Septal leaflet
Inferior leaflet
Right fibrous ring
Right fibrous trigone
Atrioventricular nodal branch of right coronary a.

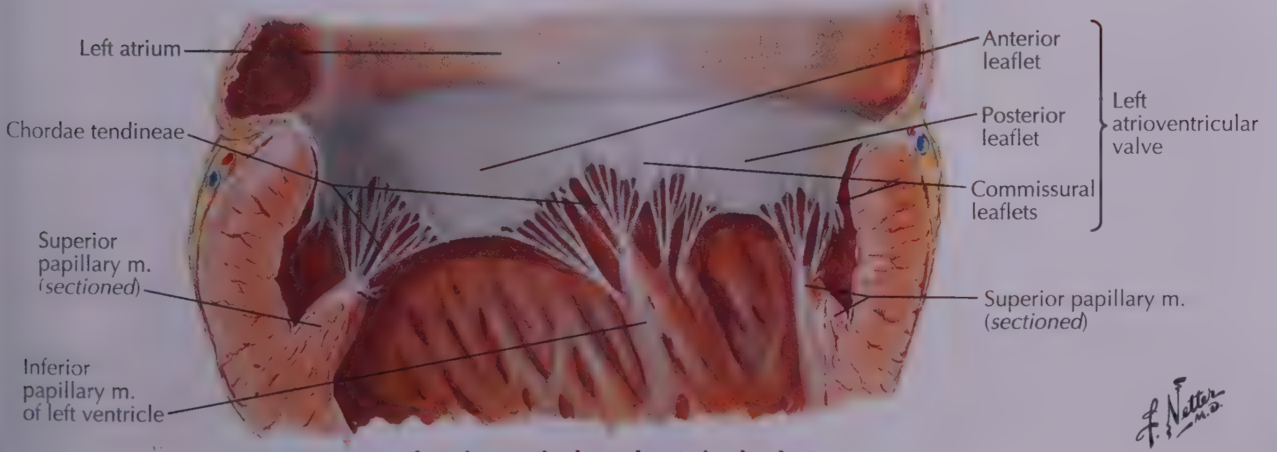
Heart in systole:
viewed from base with atria removed


Ascending aorta
Aortic sinuses (of Valsalva)
Opening of right coronary a.
Atrioventricular septum
Membranous part of interventricular septum
Muscular part of interventricular septum
Commissure of semilunar leaflets of aortic valve
Opening of left coronary a.
Nodule of semilunar leaflet (body of Arantius)
Lunula of semilunar leaflet
Left coronary leaflet
Noncoronary leaflet
Right coronary leaflet
Aortic valve
Superior papillary m.
Anterior leaflet of left atrioventricular valve

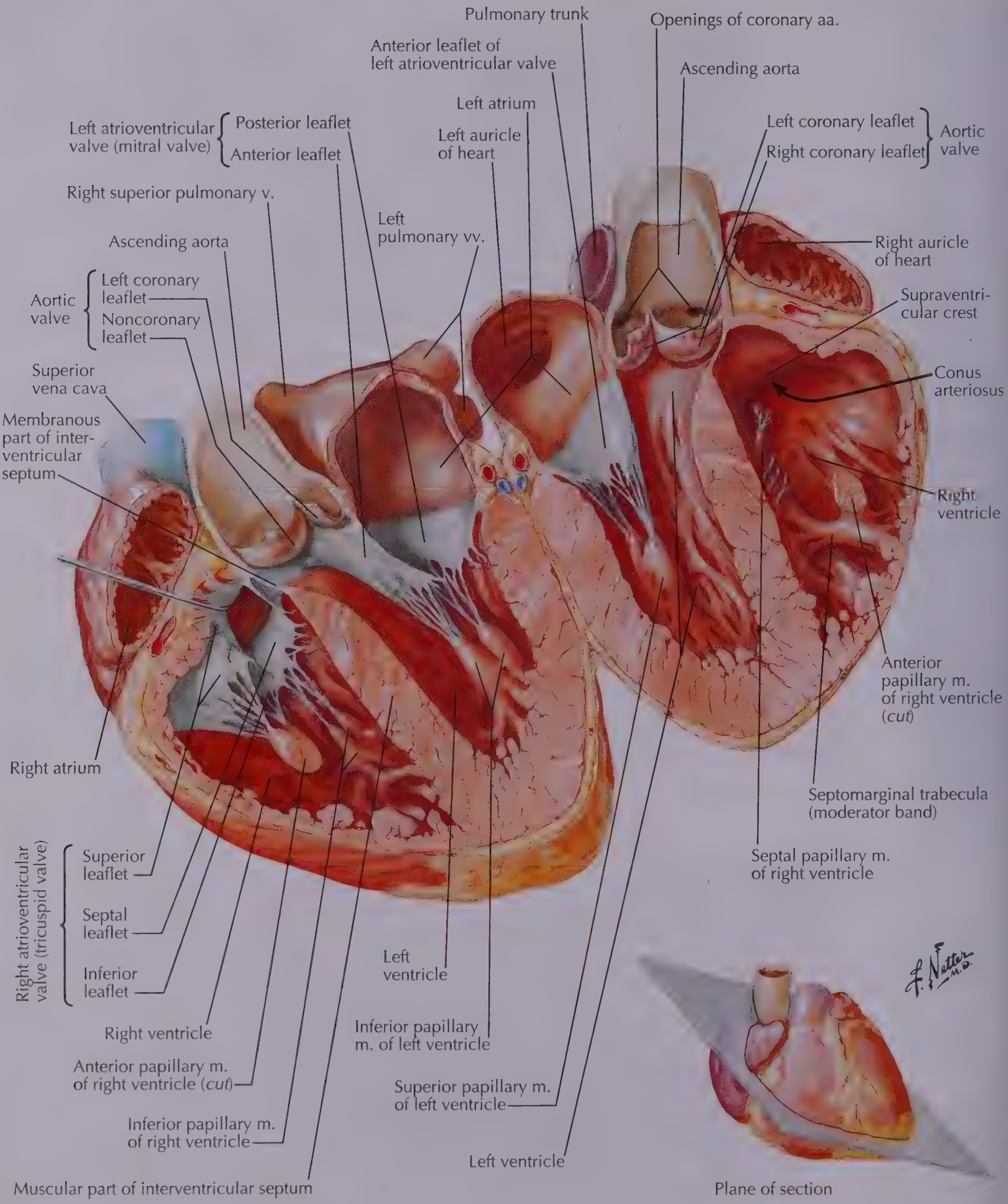
Aortic valve

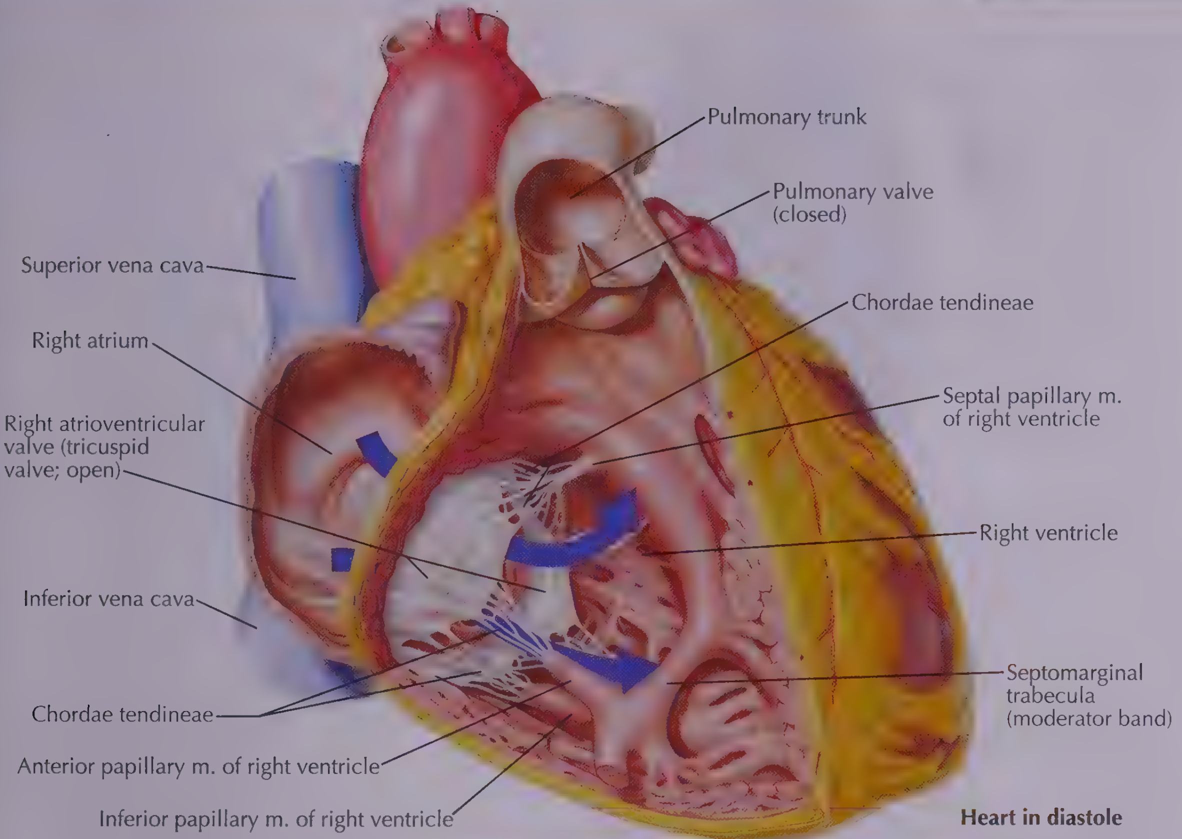

Opening of inferior vena cava
Right atrium
Opening of coronary sinus
Chordae tendineae
Septal papillary m.
Inferior papillary m. of right ventricle (*sectioned*)
Atrioventricular septum
Membranous part of interventricular septum (*behind valve*)
Inferior leaflet
Superior leaflet
Septal leaflet
Right atrioventricular valve
Inferior papillary m. of right ventricle (*sectioned*)
Anterior papillary m.

Right atrioventricular valve (tricuspid valve)

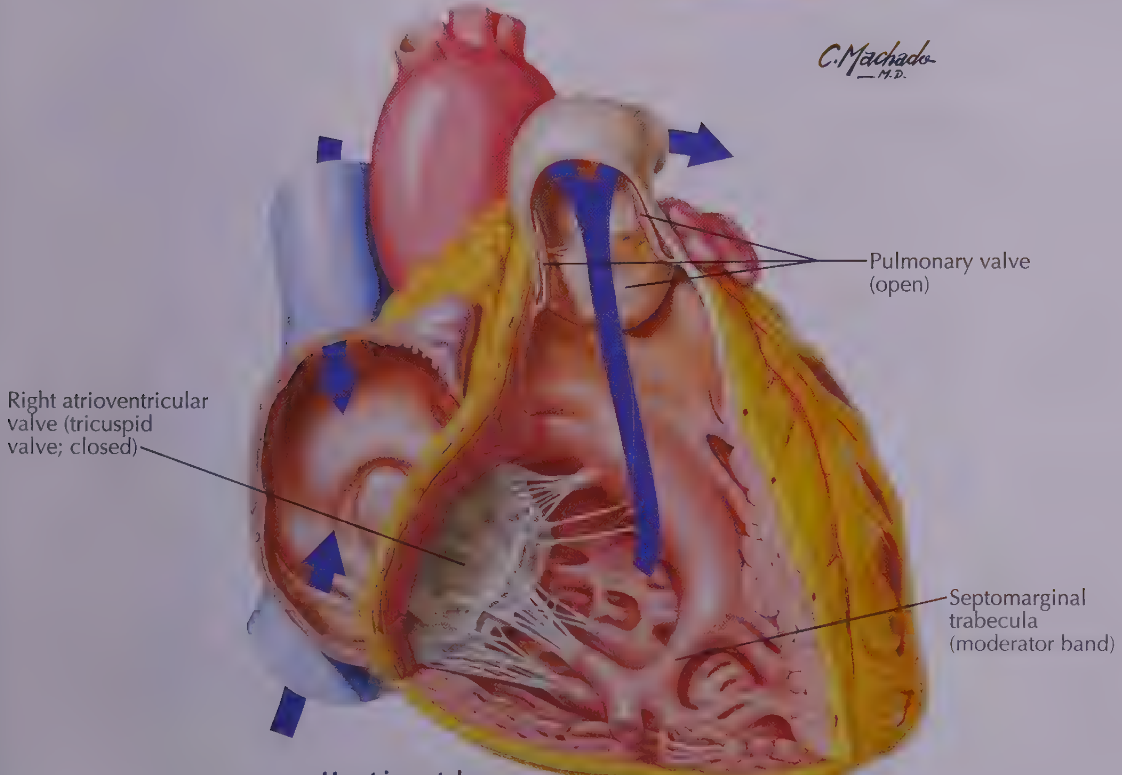

Left atrium
Chordae tendineae
Superior papillary m. (*sectioned*)
Inferior papillary m. of left ventricle
Anterior leaflet
Posterior leaflet
Commissural leaflets
Left atrioventricular valve
Superior papillary m. (*sectioned*)
F. Netter M.D.

Left atrioventricular valve (mitral valve)


Pulmonary trunk
Openings of coronary aa.
Anterior leaflet of left atrioventricular valve
Ascending aorta
Left atrium
Left atrioventricular valve (mitral valve)
Posterior leaflet
Anterior leaflet
Left auricle of heart
Left coronary leaflet
Right coronary leaflet
Aortic valve
Right superior pulmonary v.
Left pulmonary vv.
Right auricle of heart
Ascending aorta
Aortic valve
Left coronary leaflet
Noncoronary leaflet
Supraventricular crest
Superior vena cava
Conus arteriosus
Membranous part of interventricular septum
Right ventricle
Anterior papillary m. of right ventricle (*cut*)
Right atrium
Septomarginal trabecula (moderator band)
Septal papillary m. of right ventricle
Right atrioventricular valve (tricuspid valve)
Superior leaflet
Septal leaflet
Inferior leaflet
Left ventricle
Right ventricle
Inferior papillary m. of left ventricle
Anterior papillary m. of right ventricle (*cut*)
Superior papillary m. of left ventricle
Inferior papillary m. of right ventricle
Left ventricle
Muscular part of interventricular septum
Plane of section

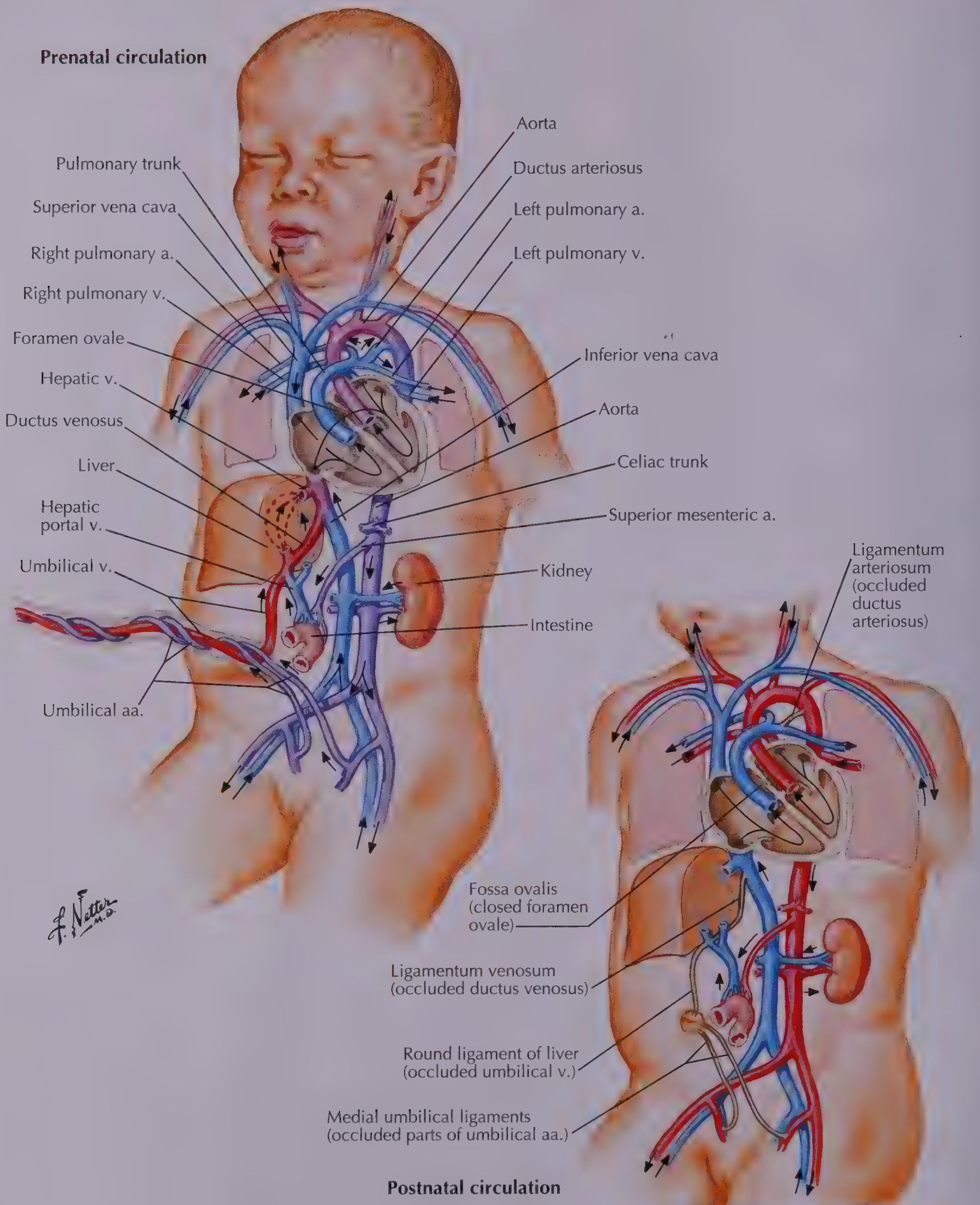

Pulmonary trunk
Pulmonary valve (closed)
Superior vena cava
Chordae tendineae
Right atrium
Septal papillary m. of right ventricle
Right atrioventricular valve (tricuspid valve; open)
Right ventricle
Inferior vena cava
Septomarginal trabecula (moderator band)
Chordae tendineae
Anterior papillary m. of right ventricle
Inferior papillary m. of right ventricle

Heart in diastole


C. Machado M.D.
Pulmonary valve (open)
Right atrioventricular valve (tricuspid valve; closed)
Septomarginal trabecula (moderator band)

Heart in systole

Prenatal and Postnatal Circulation



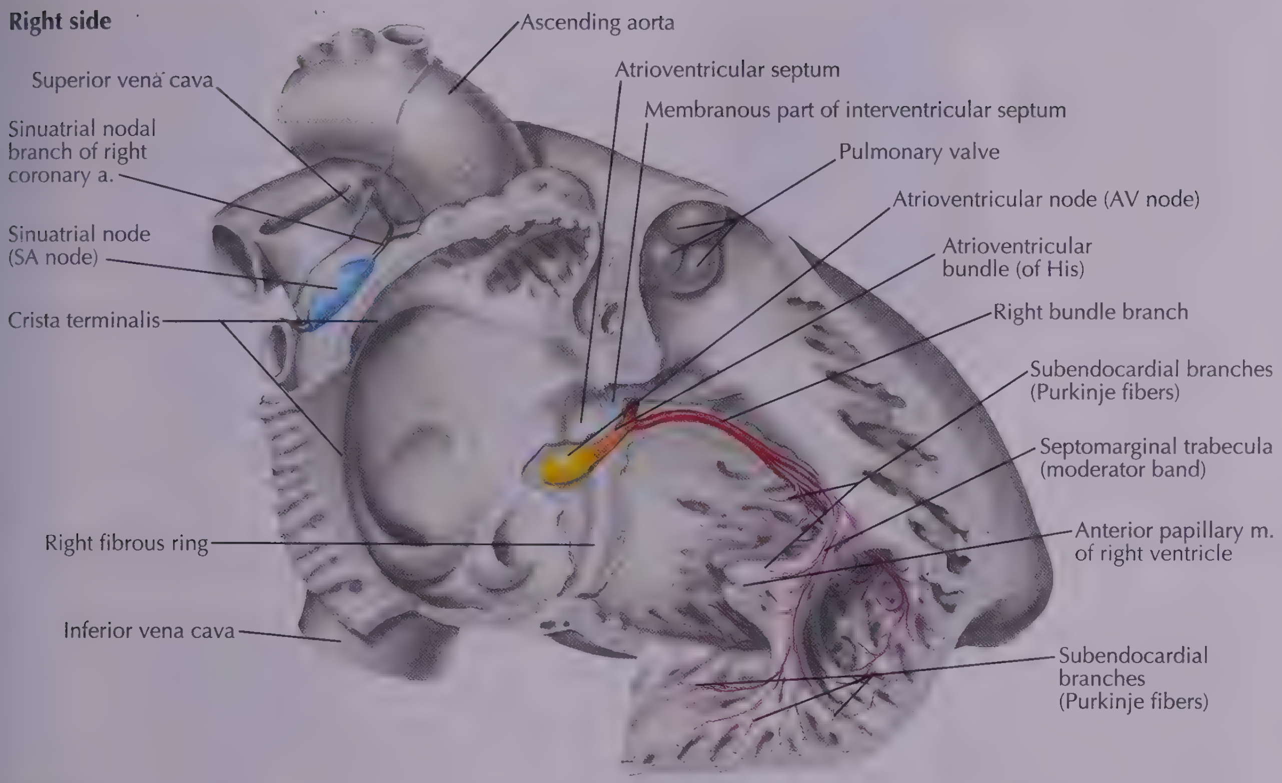
Prenatal circulation

Pulmonary trunk
Superior vena cava
Right pulmonary a.
Right pulmonary v.
Foramen ovale
Hepatic v.
Ductus venosus
Liver
Hepatic portal v.
Umbilical v.
Umbilical aa.
Aorta
Ductus arteriosus
Left pulmonary a.
Left pulmonary v.
Inferior vena cava
Aorta
Celiac trunk
Superior mesenteric a.
Kidney
Intestine
F. Netter M.D.

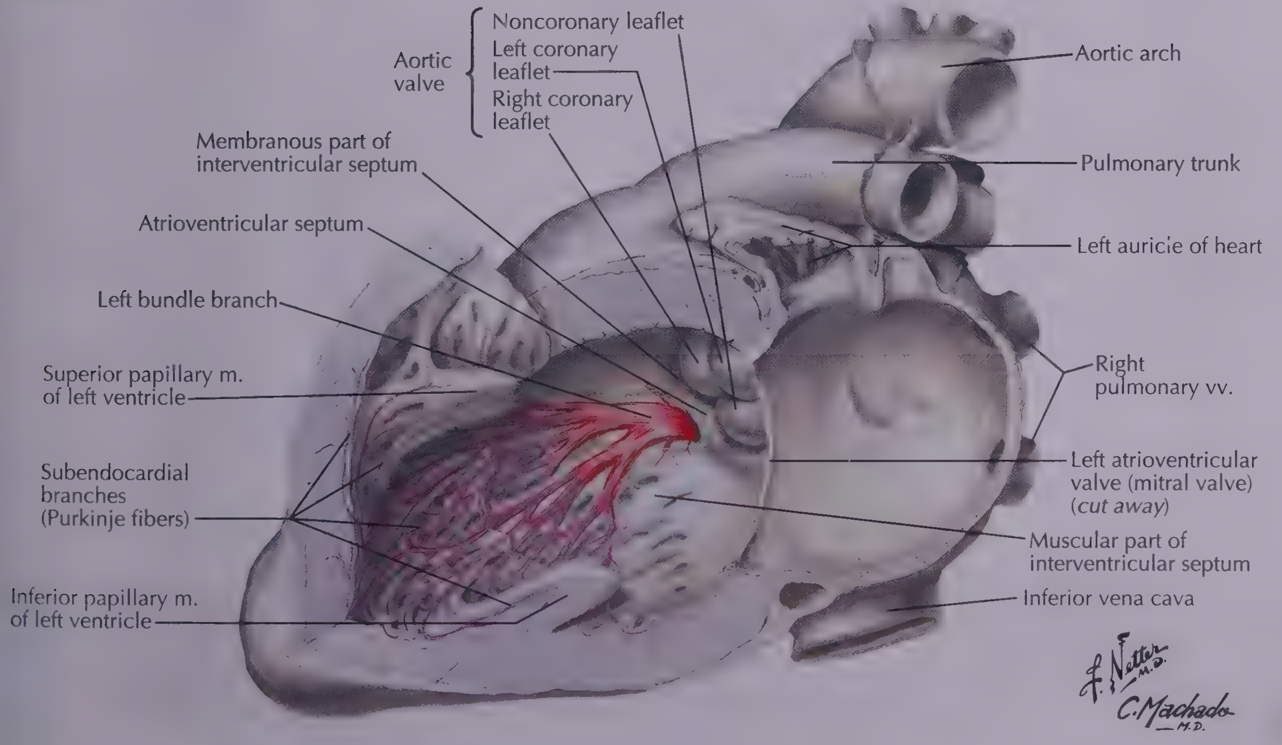
Postnatal circulation

Ligamentum arteriosum (occluded ductus arteriosus)
Fossa ovalis (closed foramen ovale)
Ligamentum venosum (occluded ductus venosus)
Round ligament of liver (occluded umbilical v.)
Medial umbilical ligaments (occluded parts of umbilical aa.)

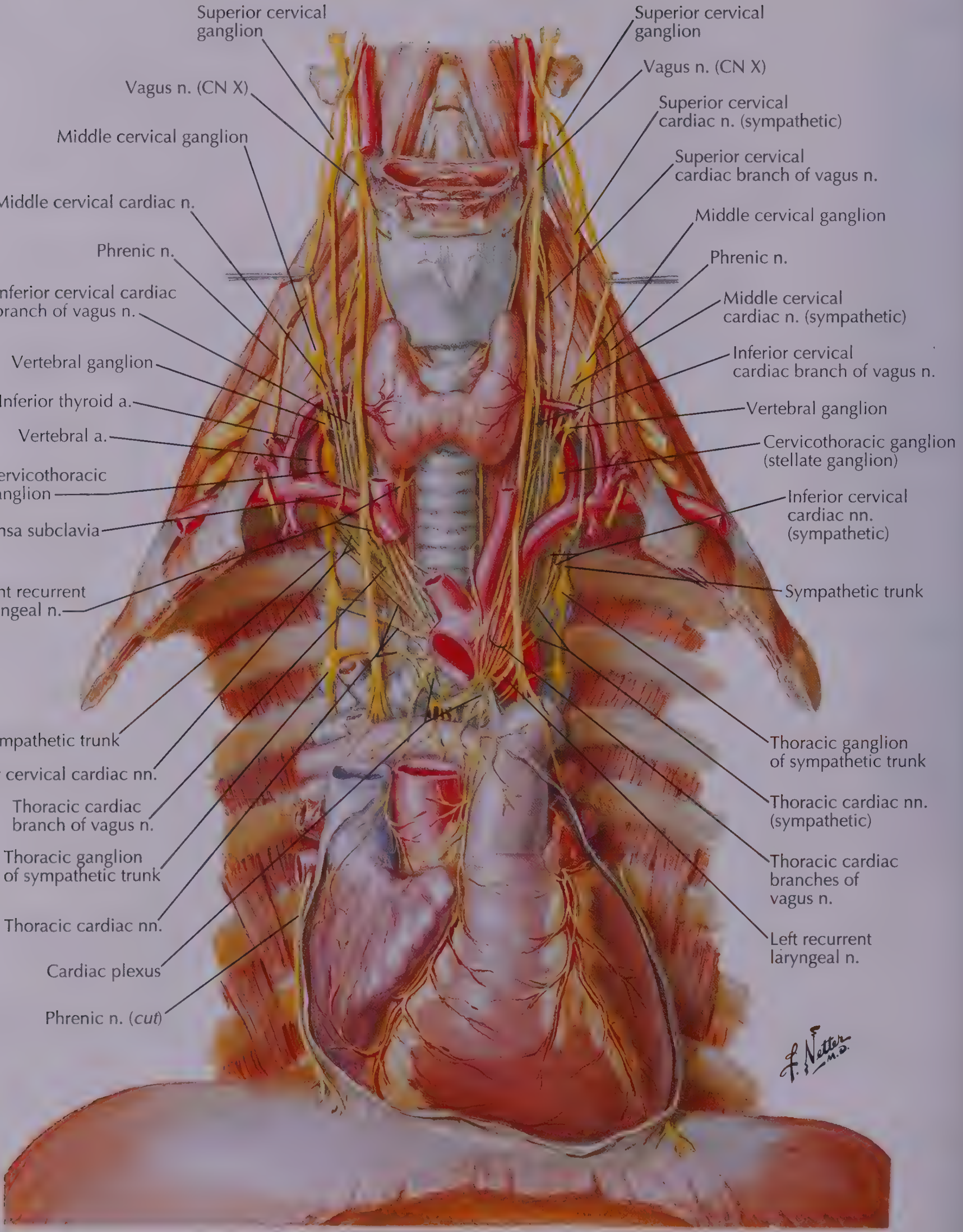
Right side


Ascending aorta
Superior vena cava
Atrioventricular septum
Membranous part of interventricular septum
Sinuatrial nodal branch of right coronary a.
Pulmonary valve
Atrioventricular node (AV node)
Sinuatrial node (SA node)
Atrioventricular bundle (of His)
Right bundle branch
Crista terminalis
Subendocardial branches (Purkinje fibers)
Septomarginal trabecula (moderator band)
Right fibrous ring
Anterior papillary m. of right ventricle
Inferior vena cava
Subendocardial branches (Purkinje fibers)

Left side

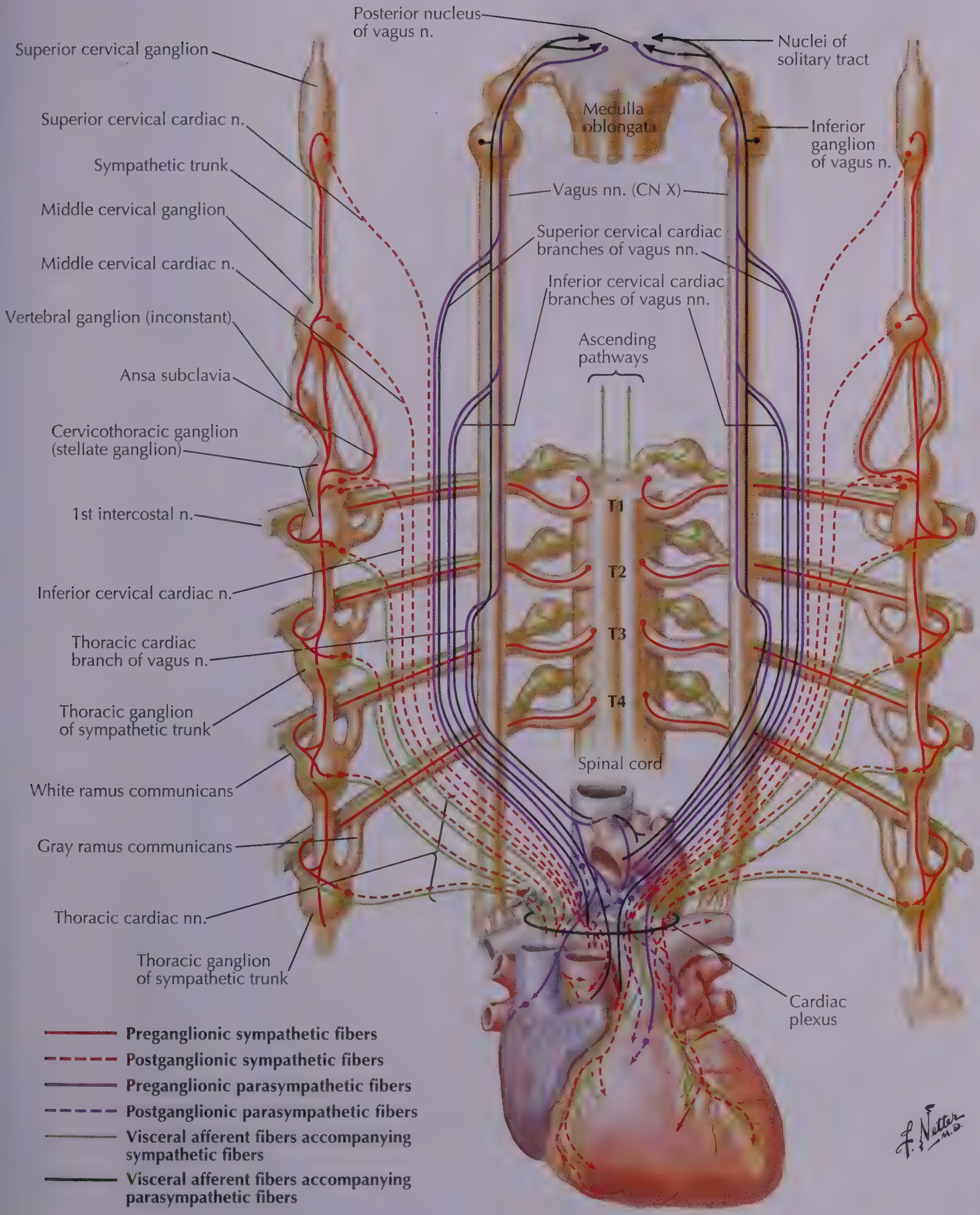

Aortic valve
Noncoronary leaflet
Left coronary leaflet
Right coronary leaflet
Aortic arch
Membranous part of interventricular septum
Pulmonary trunk
Atrioventricular septum
Left auricle of heart
Left bundle branch
Superior papillary m. of left ventricle
Right pulmonary vv.
Subendocardial branches (Purkinje fibers)
Left atrioventricular valve (mitral valve) (cut away)
Muscular part of interventricular septum
Inferior papillary m. of left ventricle
Inferior vena cava
F. Netter M.D.
C. Machado M.D.

See also Plate 229

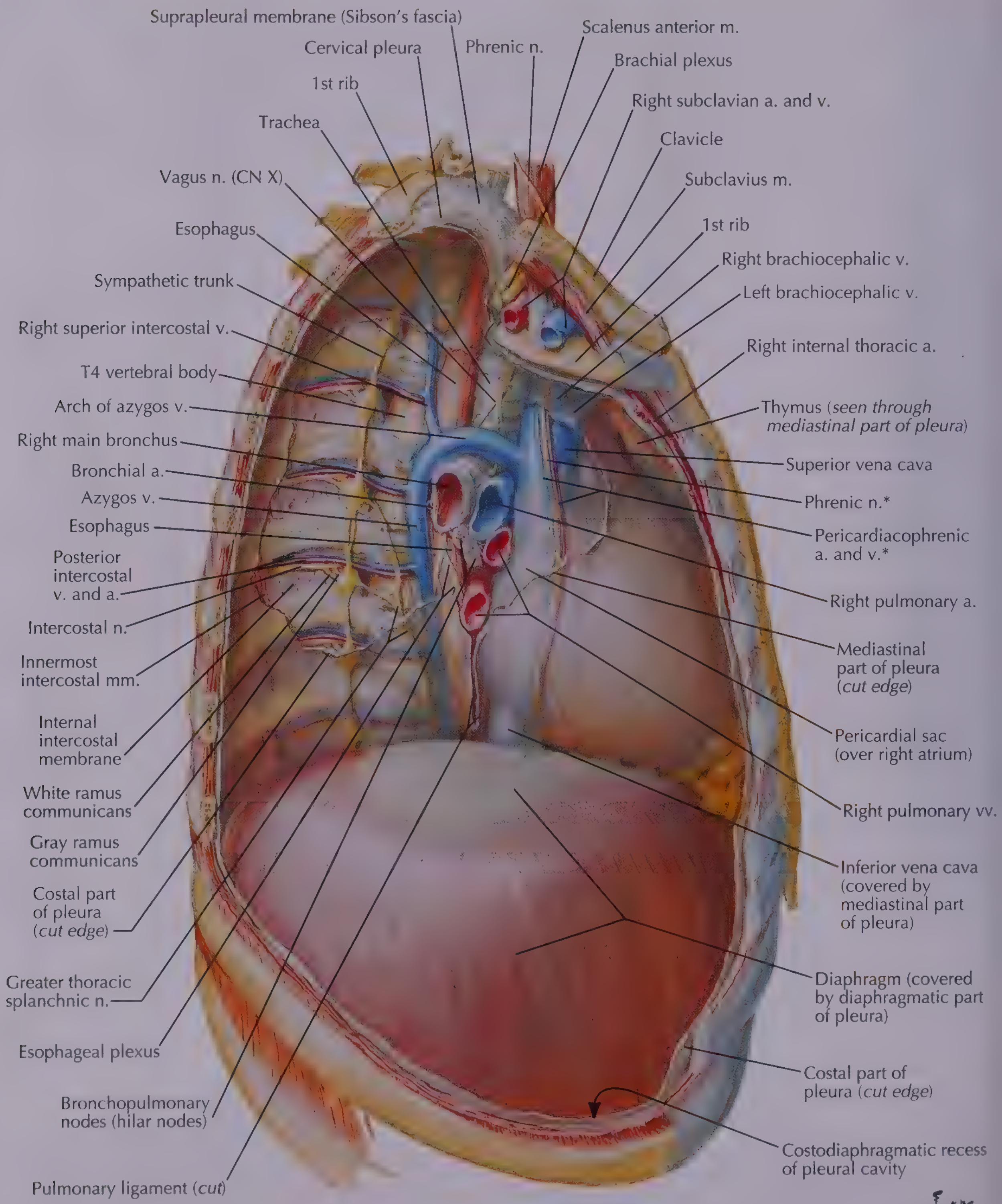

Superior cervical ganglion
Vagus n. (CN X)
Middle cervical ganglion
Middle cervical cardiac n.
Phrenic n.
Inferior cervical cardiac branch of vagus n.
Vertebral ganglion
Inferior thyroid a.
Vertebral a.
Cervicothoracic ganglion
Ansa subclavia
Right recurrent laryngeal n.
Sympathetic trunk
Inferior cervical cardiac nn.
Thoracic cardiac branch of vagus n.
Thoracic ganglion of sympathetic trunk
Thoracic cardiac nn.
Cardiac plexus
Phrenic n. (*cut*)
Superior cervical ganglion
Vagus n. (CN X)
Superior cervical cardiac n. (sympathetic)
Superior cervical cardiac branch of vagus n.
Middle cervical ganglion
Phrenic n.
Middle cervical cardiac n. (sympathetic)
Inferior cervical cardiac branch of vagus n.
Vertebral ganglion
Cervicothoracic ganglion (stellate ganglion)
Inferior cervical cardiac nn. (sympathetic)
Sympathetic trunk
Thoracic ganglion of sympathetic trunk
Thoracic cardiac nn. (sympathetic)
Thoracic cardiac branches of vagus n.
Left recurrent laryngeal n.
F. Netter M.D.

Innervation of Heart: Schema

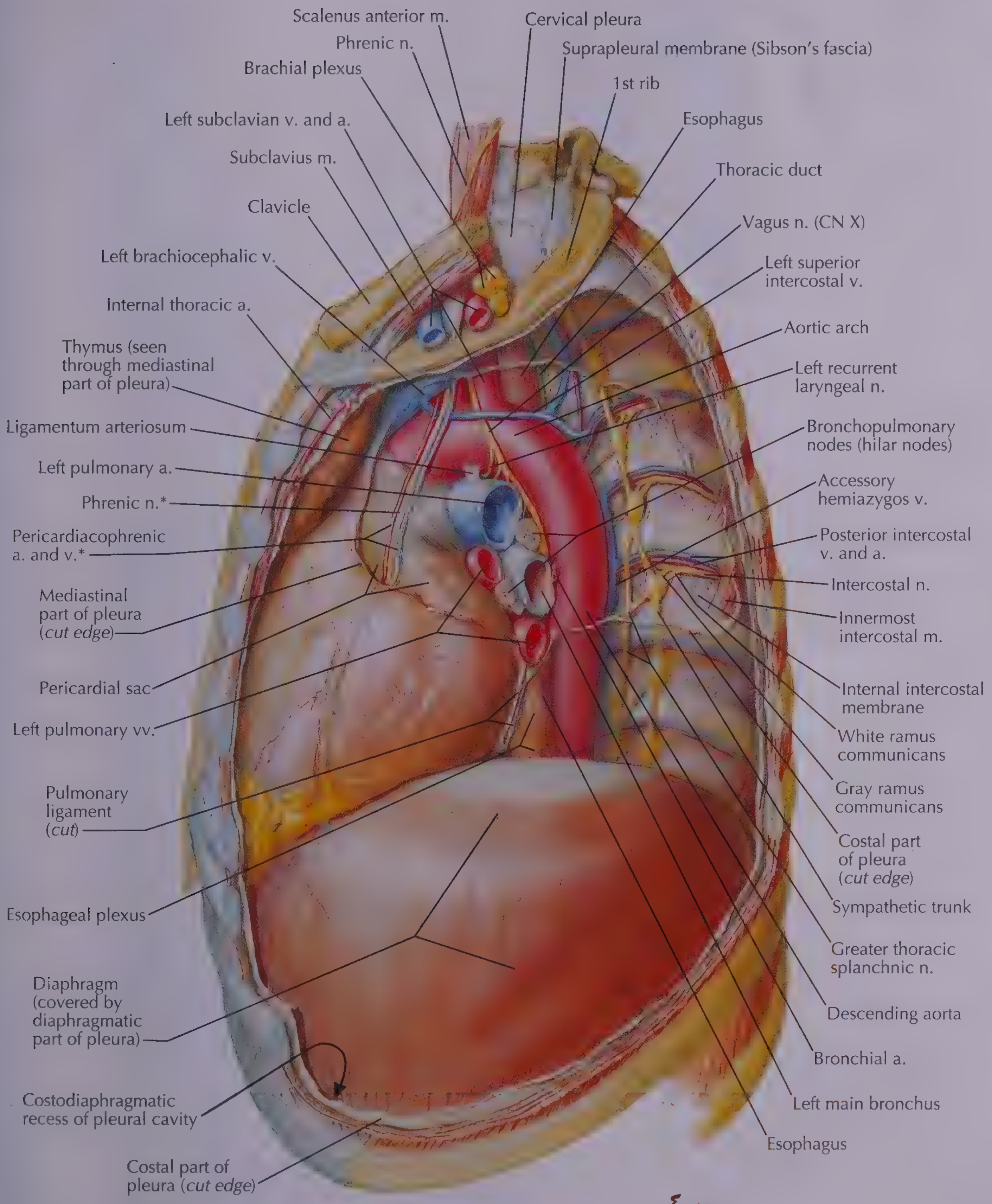
See also Plate 230


Posterior nucleus of vagus n.
Nuclei of solitary tract
Superior cervical ganglion
Superior cervical cardiac n.
Sympathetic trunk
Middle cervical ganglion
Middle cervical cardiac n.
Vertebral ganglion (inconstant)
Ansa subclavia
Cervicothoracic ganglion (stellate ganglion)
1st intercostal n.
Inferior cervical cardiac n.
Thoracic cardiac branch of vagus n.
Thoracic ganglion of sympathetic trunk
White ramus communicans
Gray ramus communicans
Thoracic cardiac nn.
Thoracic ganglion of sympathetic trunk
Medulla oblongata
Inferior ganglion of vagus n.
Vagus nn. (CN X)
Superior cervical cardiac branches of vagus nn.
Inferior cervical cardiac branches of vagus nn.
Ascending pathways
T1
T2
T3
T4
Spinal cord
Cardiac plexus
Preganglionic sympathetic fibers
Postganglionic sympathetic fibers
Preganglionic parasympathetic fibers
Postganglionic parasympathetic fibers
Visceral afferent fibers accompanying sympathetic fibers
Visceral afferent fibers accompanying parasympathetic fibers

Mediastinum: Right Lateral View


Suprapleural membrane (Sibson's fascia)
Cervical pleura
Phrenic n.
Scalenus anterior m.
Brachial plexus
Right subclavian a. and v.
1st rib
Trachea
Clavicle
Vagus n. (CN X)
Subclavius m.
Esophagus
1st rib
Sympathetic trunk
Right brachiocephalic v.
Left brachiocephalic v.
Right superior intercostal v.
Right internal thoracic a.
T4 vertebral body
Arch of azygos v.
Thymus (*seen through mediastinal part of pleura*)
Right main bronchus
Superior vena cava
Bronchial a.
Azygos v.
Phrenic n.*
Esophagus
Pericardiacophrenic a. and v.*
Posterior intercostal v. and a.
Right pulmonary a.
Intercostal n.
Innermost intercostal mm.
Mediastinal part of pleura (*cut edge*)
Internal intercostal membrane
Pericardial sac (over right atrium)
White ramus communicans
Right pulmonary vv.
Gray ramus communicans
Inferior vena cava (covered by mediastinal part of pleura)
Costal part of pleura (*cut edge*)
Greater thoracic splanchnic n.
Diaphragm (covered by diaphragmatic part of pleura)
Esophageal plexus
Costal part of pleura (*cut edge*)
Bronchopulmonary nodes (hilar nodes)
Costodiaphragmatic recess of pleural cavity
Pulmonary ligament (*cut*)

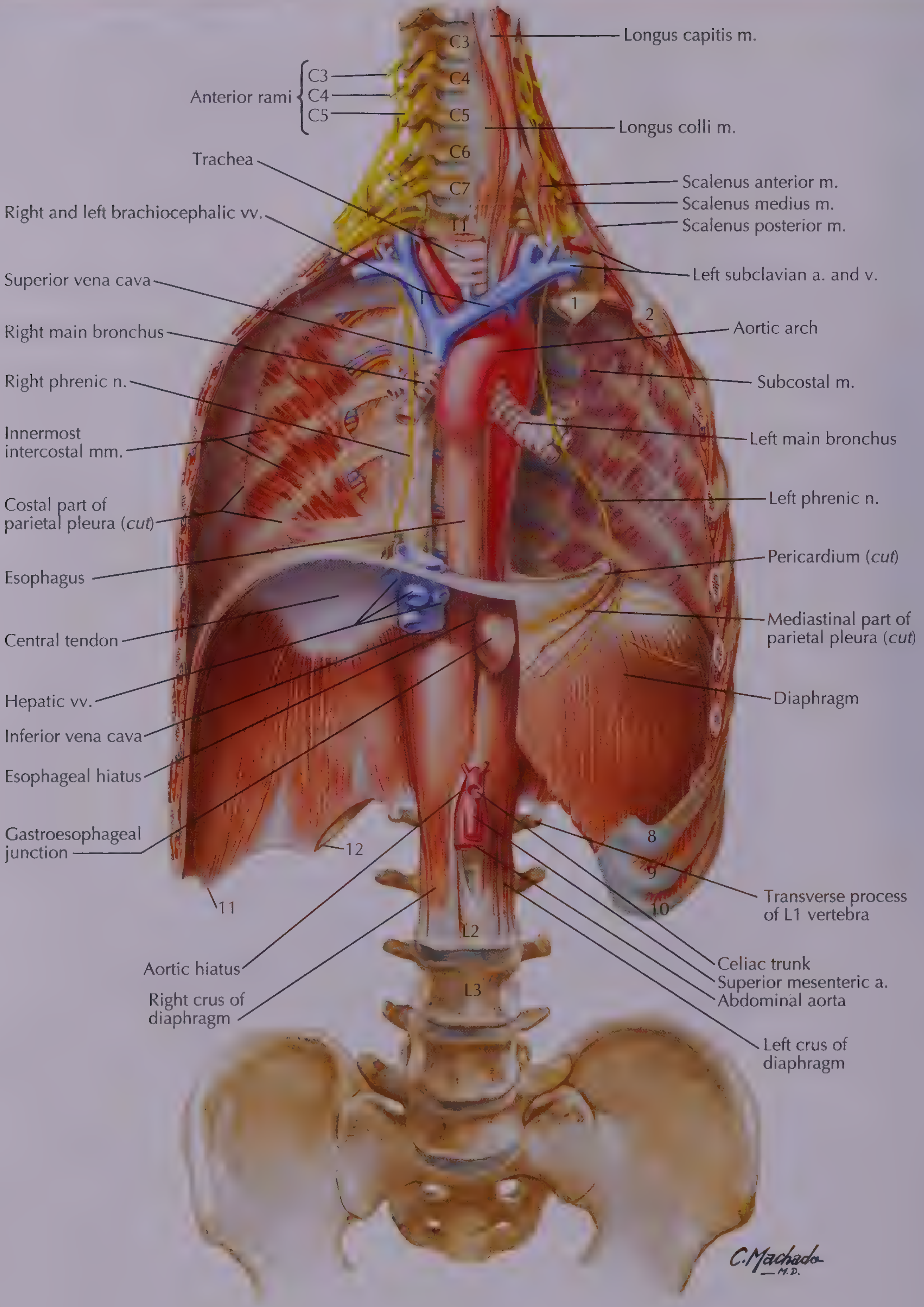
**Nerve and vessels commonly run independently.*


Scalenus anterior m.
Phrenic n.
Brachial plexus
Left subclavian v. and a.
Subclavius m.
Clavicle
Left brachiocephalic v.
Internal thoracic a.
Thymus (seen through mediastinal part of pleura)
Ligamentum arteriosum
Left pulmonary a.
Phrenic n.*
Pericardiacophrenic a. and v.*
Mediastinal part of pleura (*cut edge*)
Pericardial sac
Left pulmonary vv.
Pulmonary ligament (*cut*)
Esophageal plexus
Diaphragm (covered by diaphragmatic part of pleura)
Costodiaphragmatic recess of pleural cavity
Costal part of pleura (*cut edge*)
Cervical pleura
Suprapleural membrane (Sibson's fascia)
1st rib
Esophagus
Thoracic duct
Vagus n. (CN X)
Left superior intercostal v.
Aortic arch
Left recurrent laryngeal n.
Bronchopulmonary nodes (hilar nodes)
Accessory hemiazygos v.
Posterior intercostal v. and a.
Intercostal n.
Innermost intercostal m.
Internal intercostal membrane
White ramus communicans
Gray ramus communicans
Costal part of pleura (*cut edge*)
Sympathetic trunk
Greater thoracic splanchnic n.
Descending aorta
Bronchial a.
Left main bronchus
Esophagus

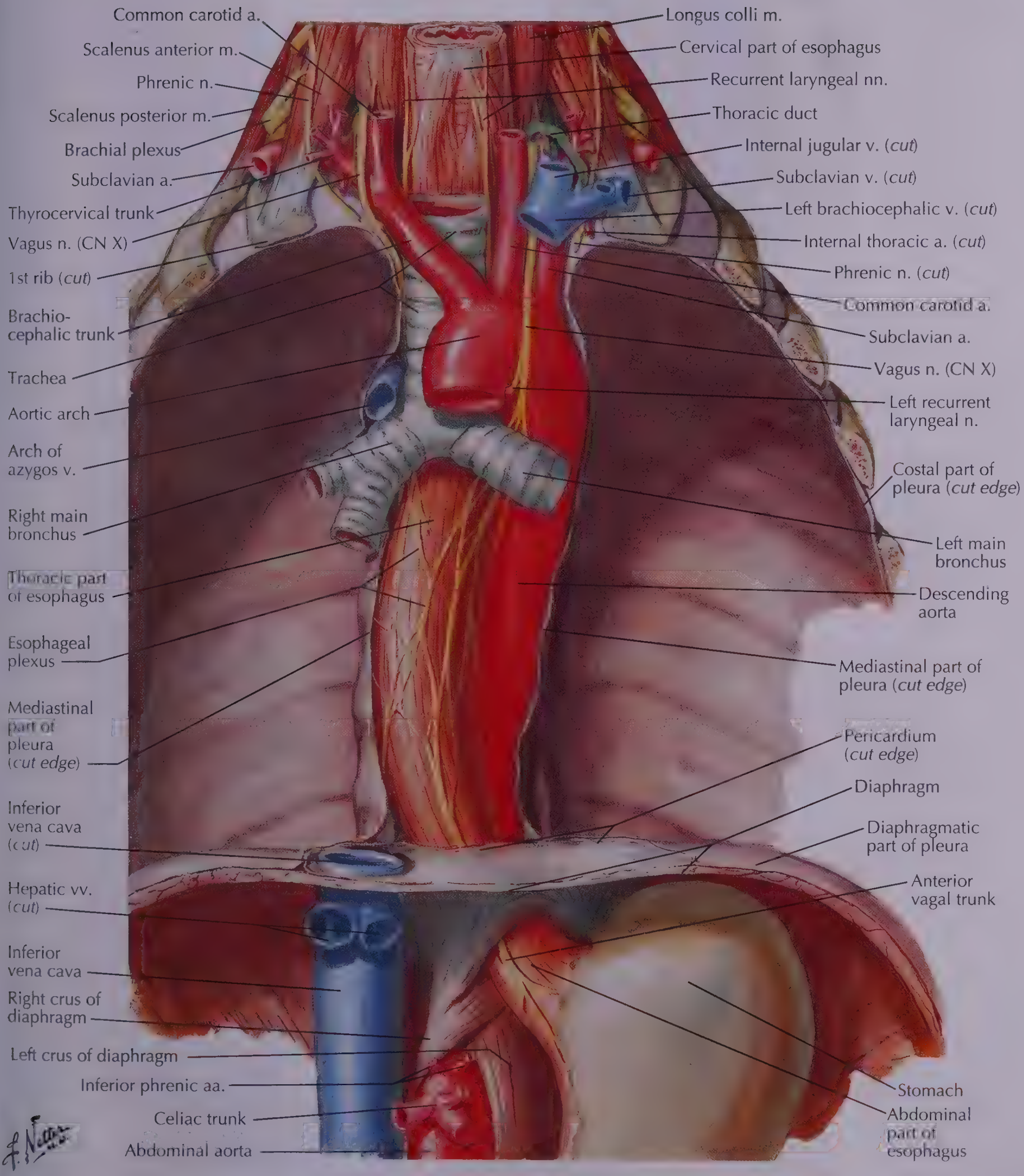
**Nerve and vessels commonly run independently.*

Phrenic Nerve

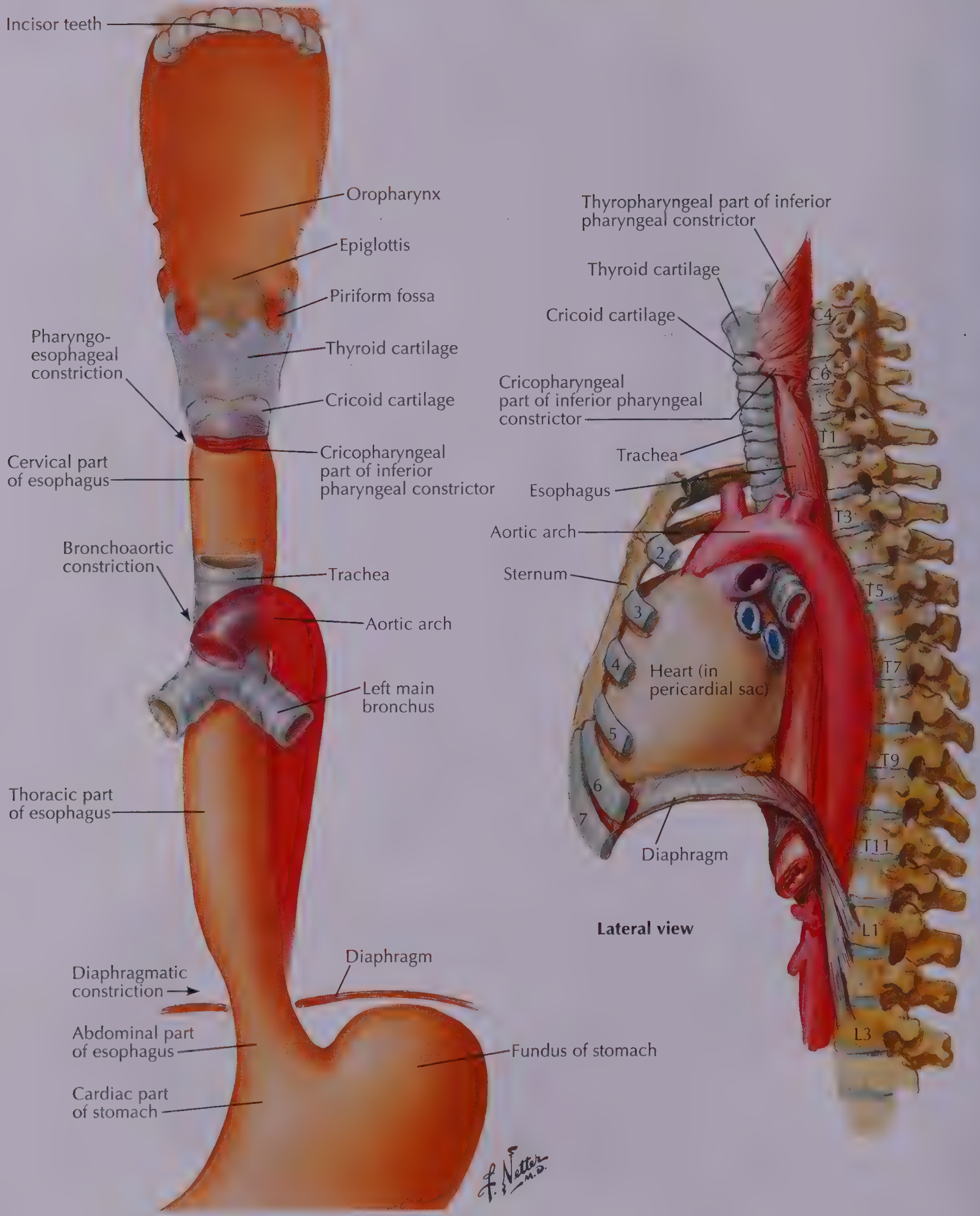
See also Plates 56, 57, 251, 252


Longus capitis m.
C3
C4
C5
C6
C7
T1
Anterior rami C3 C4 C5
Longus colli m.
Trachea
Scalenus anterior m.
Scalenus medius m.
Scalenus posterior m.
Right and left brachiocephalic vv.
Left subclavian a. and v.
Superior vena cava
1
1
2
Aortic arch
Right main bronchus
Subcostal m.
Right phrenic n.
Innermost intercostal mm.
Left main bronchus
Costal part of parietal pleura (*cut*)
Left phrenic n.
Pericardium (*cut*)
Esophagus
Mediastinal part of parietal pleura (*cut*)
Central tendon
Diaphragm
Hepatic vv.
Inferior vena cava
Esophageal hiatus
Gastroesophageal junction
12
8
9
10
11
Transverse process of L1 vertebra
L2
Aortic hiatus
Celiac trunk
Superior mesenteric a.
Abdominal aorta
Right crus of diaphragm
L3
Left crus of diaphragm
C. Machado M.D.

Esophagus in Situ

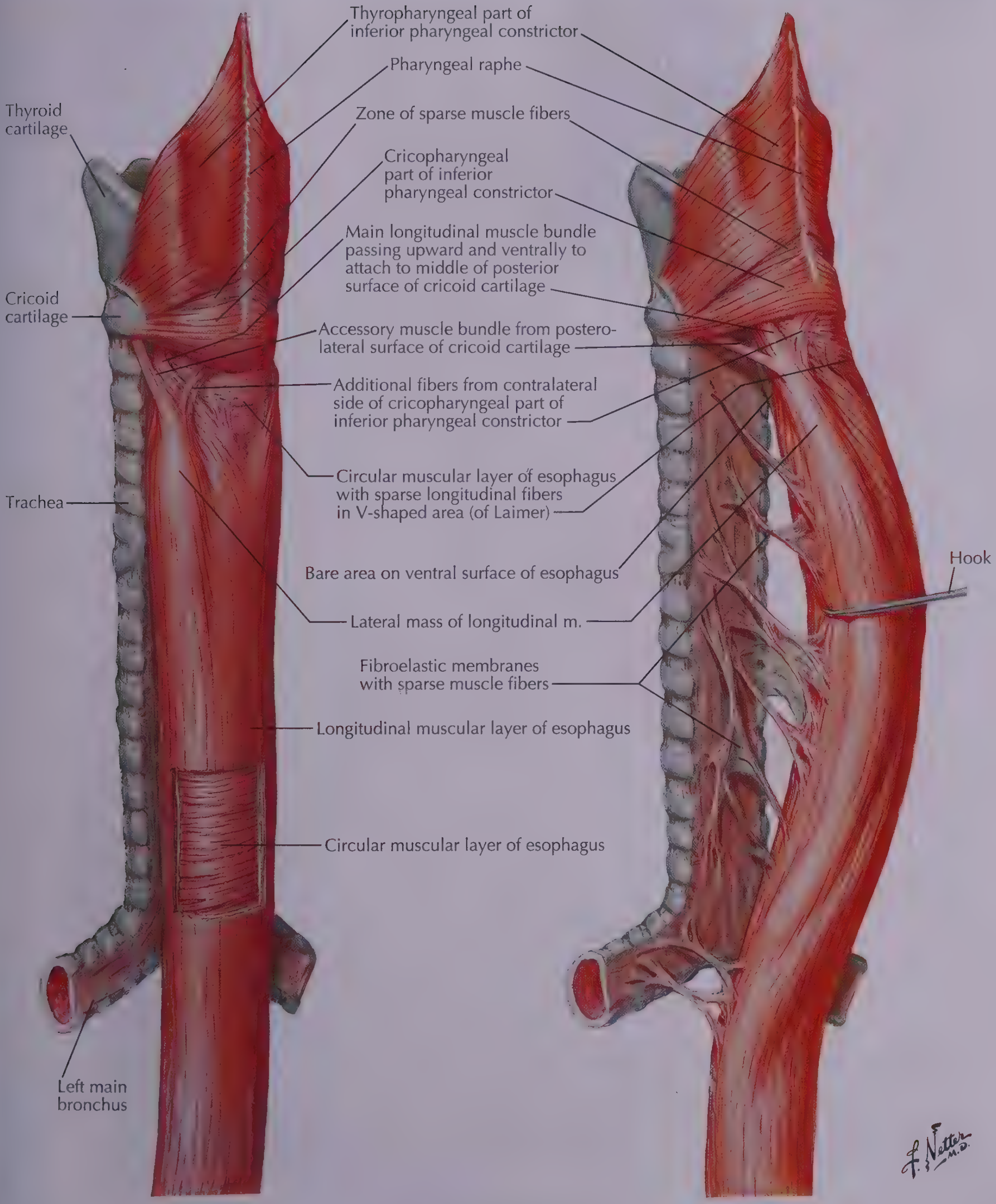

Common carotid a.
Scalenus anterior m.
Phrenic n.
Scalenus posterior m.
Brachial plexus
Subclavian a.
Thyrocervical trunk
Vagus n. (CN X)
1st rib (*cut*)
Brachiocephalic trunk
Trachea
Aortic arch
Arch of azygos v.
Right main bronchus
Thoracic part of esophagus
Esophageal plexus
Mediastinal part of pleura (*cut edge*)
Inferior vena cava (*cut*)
Hepatic vv. (*cut*)
Inferior vena cava
Right crus of diaphragm
Left crus of diaphragm
Inferior phrenic aa.
Celiac trunk
Abdominal aorta
Longus colli m.
Cervical part of esophagus
Recurrent laryngeal nn.
Thoracic duct
Internal jugular v. (*cut*)
Subclavian v. (*cut*)
Left brachiocephalic v. (*cut*)
Internal thoracic a. (*cut*)
Phrenic n. (*cut*)
Common carotid a.
Subclavian a.
Vagus n. (CN X)
Left recurrent laryngeal n.
Costal part of pleura (*cut edge*)
Left main bronchus
Descending aorta
Mediastinal part of pleura (*cut edge*)
Pericardium (*cut edge*)
Diaphragm
Diaphragmatic part of pleura
Anterior vagal trunk
Stomach
Abdominal part of esophagus

Esophagus: Constrictions and Relations


Incisor teeth
Oropharynx
Epiglottis
Piriform fossa
Pharyngo-esophageal constriction
Thyroid cartilage
Cricoid cartilage
Cricopharyngeal part of inferior pharyngeal constrictor
Cervical part of esophagus
Bronchoaortic constriction
Trachea
Aortic arch
Left main bronchus
Thoracic part of esophagus
Diaphragm
Diaphragmatic constriction
Abdominal part of esophagus
Fundus of stomach
Cardiac part of stomach
Thyropharyngeal part of inferior pharyngeal constrictor
Thyroid cartilage
Cricoid cartilage
Cricopharyngeal part of inferior pharyngeal constrictor
Trachea
Esophagus
Aortic arch
Sternum
Heart (in pericardial sac)
Diaphragm
C4
C6
T1
T3
T5
T7
T9
T11
L1
L3
2
3
4
5
6
7

Lateral view

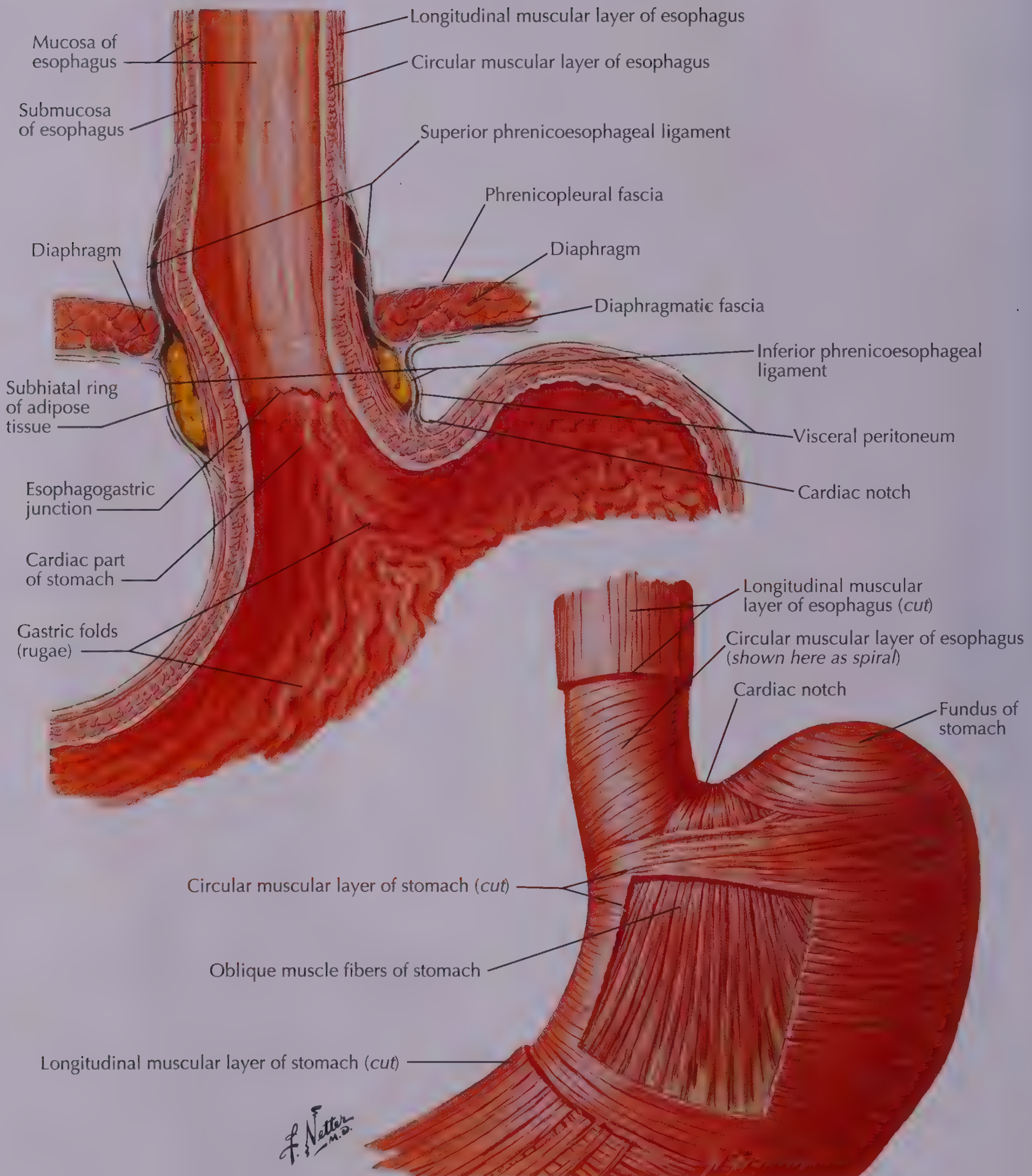
See also Plate 48


Thyropharyngeal part of inferior pharyngeal constrictor
Pharyngeal raphe
Zone of sparse muscle fibers
Thyroid cartilage
Cricopharyngeal part of inferior pharyngeal constrictor
Main longitudinal muscle bundle passing upward and ventrally to attach to middle of posterior surface of cricoid cartilage
Cricoid cartilage
Accessory muscle bundle from posterolateral surface of cricoid cartilage
Additional fibers from contralateral side of cricopharyngeal part of inferior pharyngeal constrictor
Circular muscular layer of esophagus with sparse longitudinal fibers in V-shaped area (of Laimer)
Trachea
Bare area on ventral surface of esophagus
Hook
Lateral mass of longitudinal m.
Fibroelastic membranes with sparse muscle fibers
Longitudinal muscular layer of esophagus
Circular muscular layer of esophagus
Left main bronchus
F. Netter M.D.

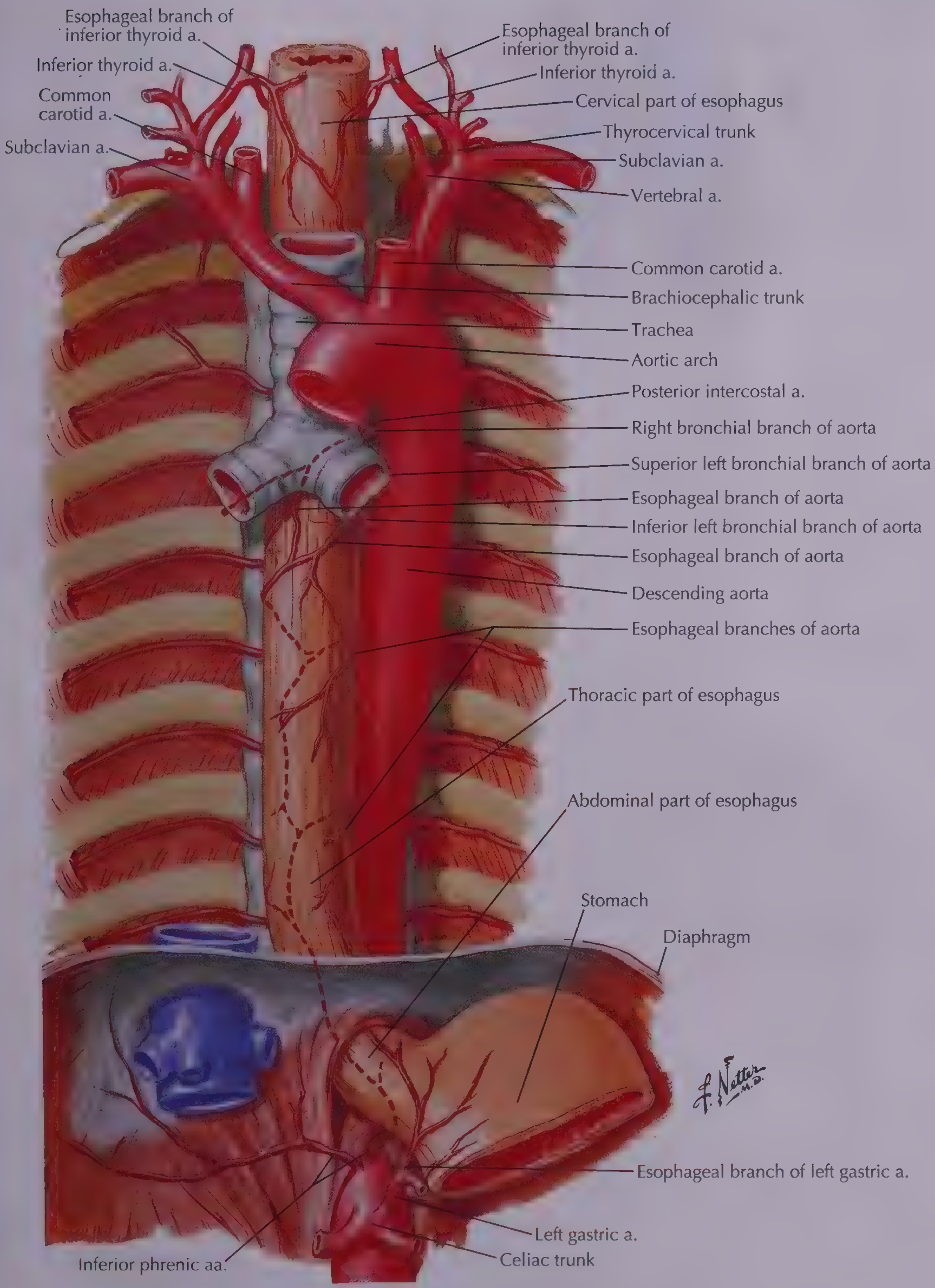
Posterolateral view

Esophagogastric Junction

See also Plate 295

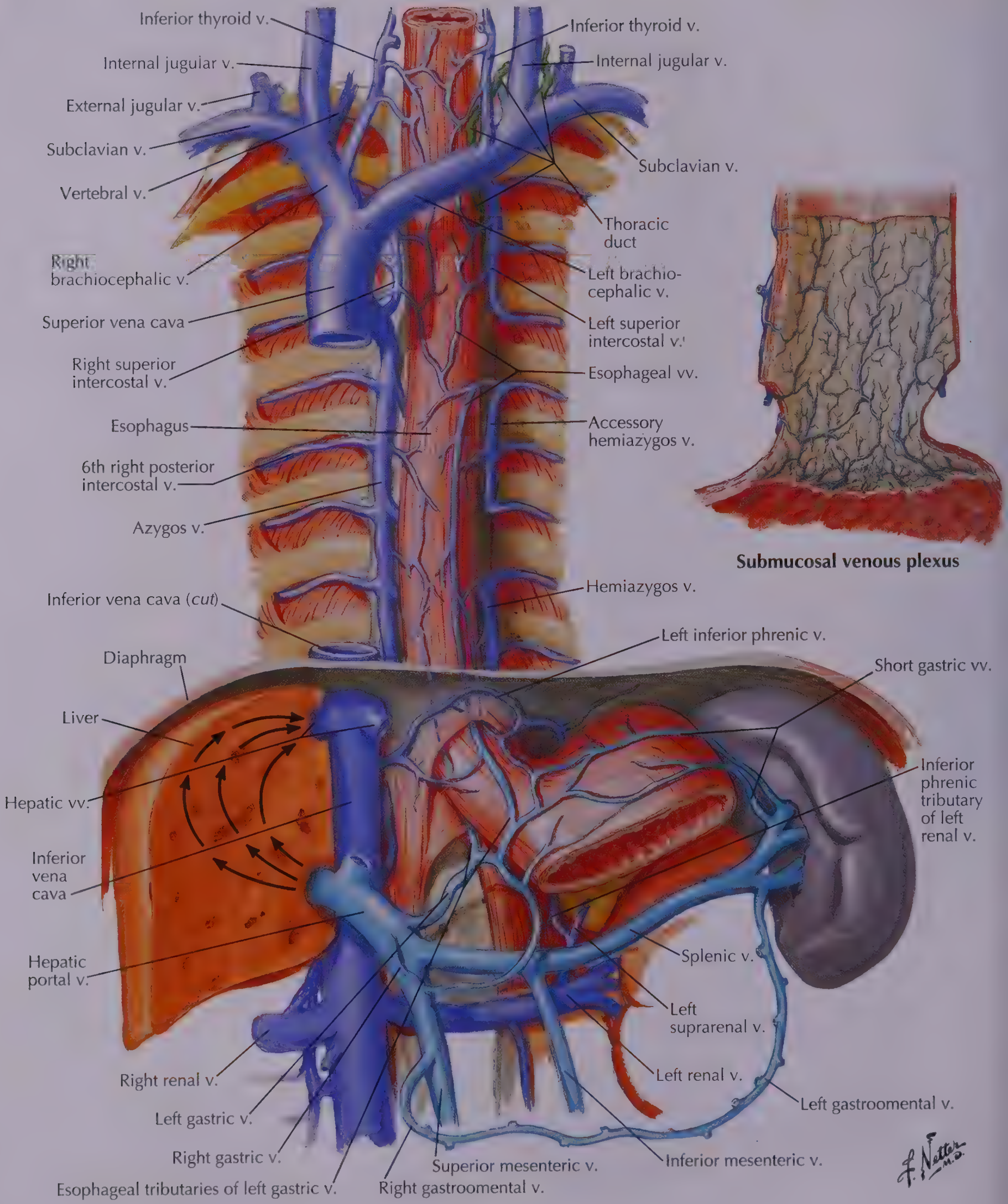

Longitudinal muscular layer of esophagus
Circular muscular layer of esophagus
Mucosa of esophagus
Submucosa of esophagus
Superior phrenicoesophageal ligament
Phrenicopleural fascia
Diaphragm
Diaphragm
Diaphragmatic fascia
Inferior phrenicoesophageal ligament
Subhiatal ring of adipose tissue
Visceral peritoneum
Cardiac notch
Esophagogastric junction
Cardiac part of stomach
Gastric folds (rugae)
Longitudinal muscular layer of esophagus (*cut*)
Circular muscular layer of esophagus (*shown here as spiral*)
Cardiac notch
Fundus of stomach
Circular muscular layer of stomach (*cut*)
Oblique muscle fibers of stomach
Longitudinal muscular layer of stomach (*cut*)

See also Plates 222, 310, BP 49


Esophageal branch of inferior thyroid a.
Inferior thyroid a.
Common carotid a.
Subclavian a.
Esophageal branch of inferior thyroid a.
Inferior thyroid a.
Cervical part of esophagus
Thyrocervical trunk
Subclavian a.
Vertebral a.
Common carotid a.
Brachiocephalic trunk
Trachea
Aortic arch
Posterior intercostal a.
Right bronchial branch of aorta
Superior left bronchial branch of aorta
Esophageal branch of aorta
Inferior left bronchial branch of aorta
Esophageal branch of aorta
Descending aorta
Esophageal branches of aorta
Thoracic part of esophagus
Abdominal part of esophagus
Stomach
Diaphragm
F. Netter M.D.
Esophageal branch of left gastric a.
Left gastric a.
Celiac trunk
Inferior phrenic aa.

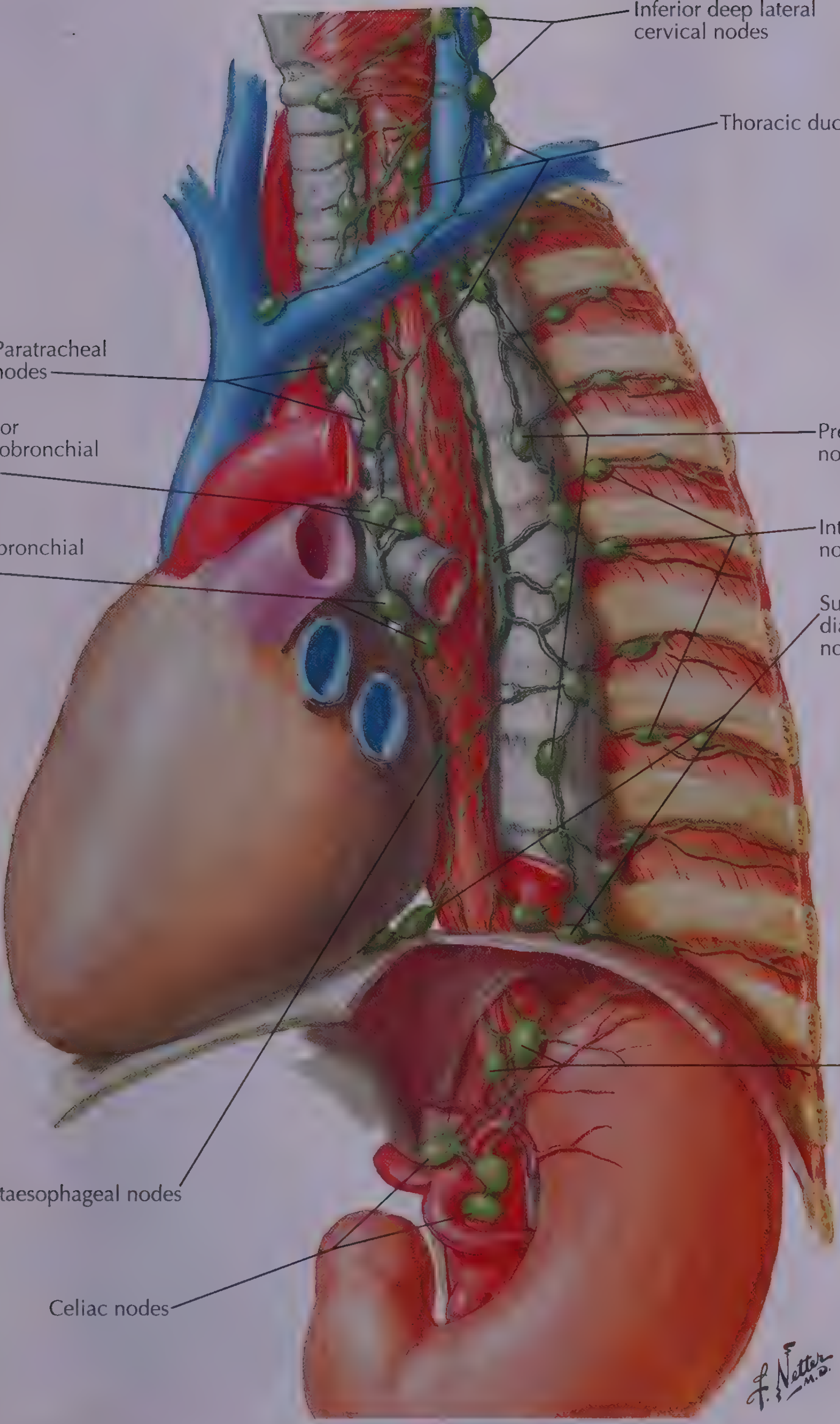
Veins of Esophagus

See also Plate 213


Inferior thyroid v.
Internal jugular v.
External jugular v.
Subclavian v.
Vertebral v.
Right brachiocephalic v.
Superior vena cava
Right superior intercostal v.
Esophagus
6th right posterior intercostal v.
Azygos v.
Inferior vena cava (*cut*)
Diaphragm
Liver
Hepatic vv.
Inferior vena cava
Hepatic portal v.
Right renal v.
Left gastric v.
Right gastric v.
Esophageal tributaries of left gastric v.
Inferior thyroid v.
Internal jugular v.
Subclavian v.
Thoracic duct
Left brachiocephalic v.
Left superior intercostal v.
Esophageal vv.
Accessory hemiazygos v.
Submucosal venous plexus
Hemiazygos v.
Left inferior phrenic v.
Short gastric vv.
Inferior phrenic tributary of left renal v.
Splenic v.
Left suprarenal v.
Left renal v.
Left gastroomental v.
Inferior mesenteric v.
Superior mesenteric v.
Right gastroomental v.
F. Netter M.D.

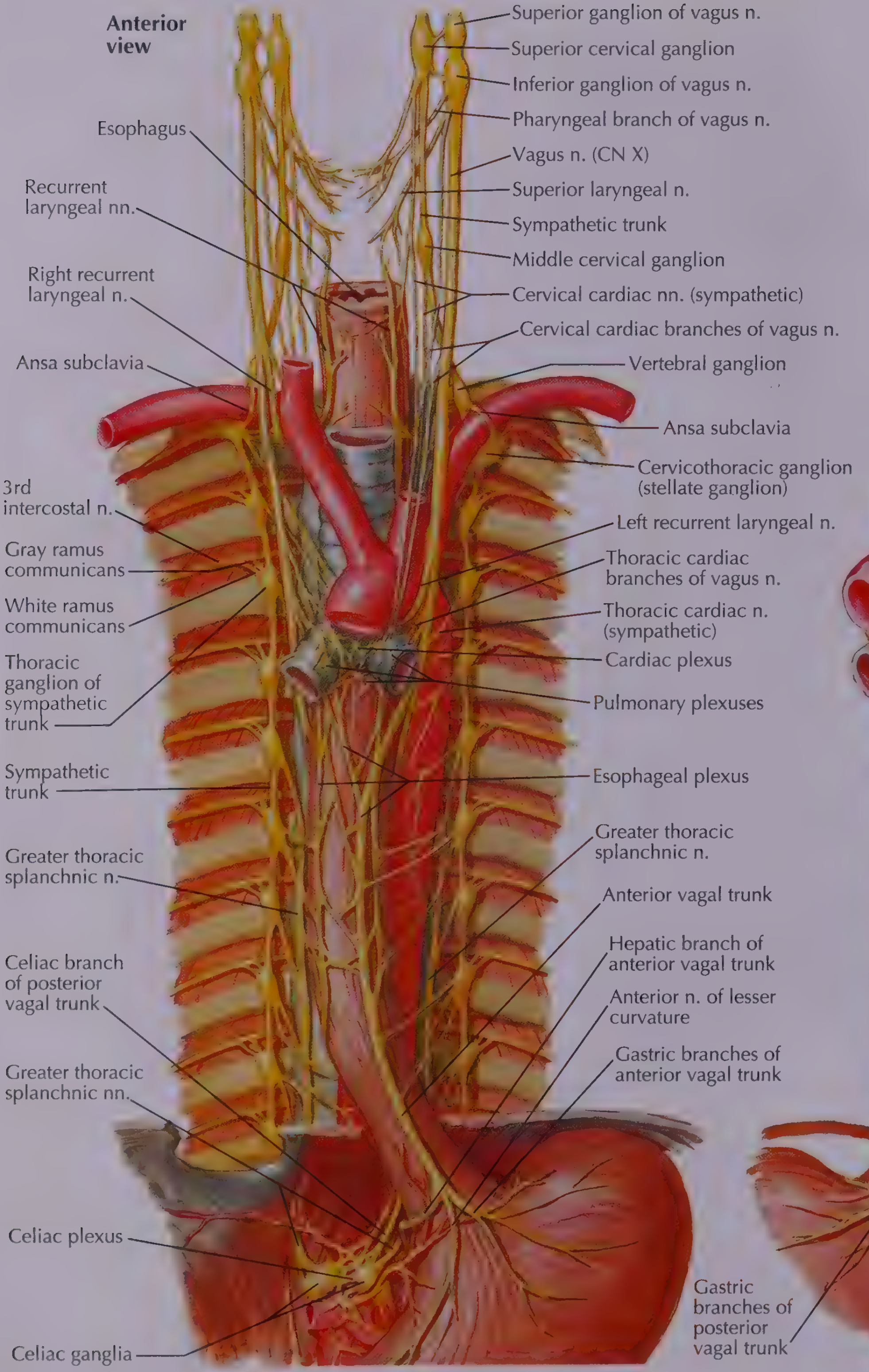
Lymph Vessels and Lymph Nodes of Esophagus

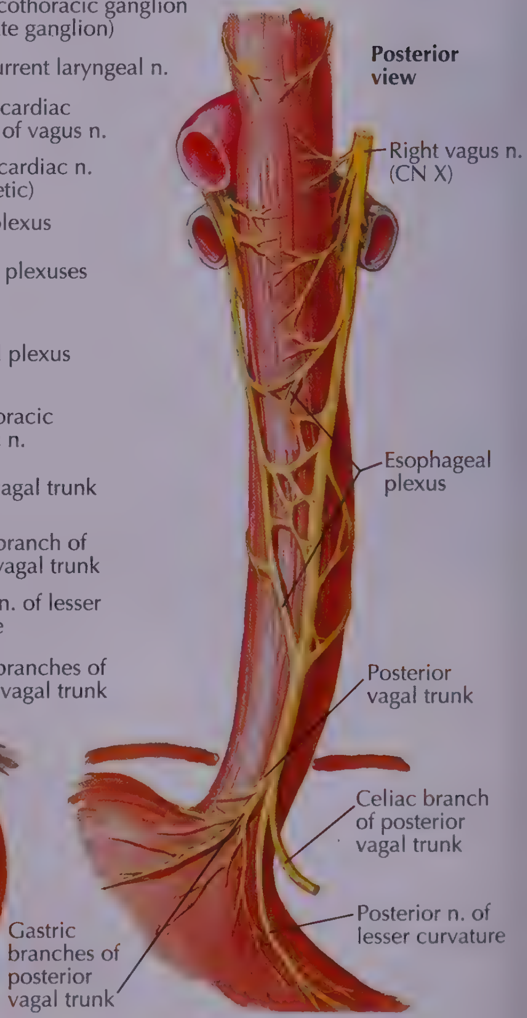
See also Plate 220


Inferior deep lateral cervical nodes
Thoracic duct
Paratracheal nodes
Superior tracheobronchial nodes
Inferior tracheobronchial nodes
Prevertebral nodes
Intercostal nodes
Superior diaphragmatic nodes
Parietal thoracic lymph nodes
Nodes around cardia
Juxtaesophageal nodes
Celiac nodes
F. Netter M.D.

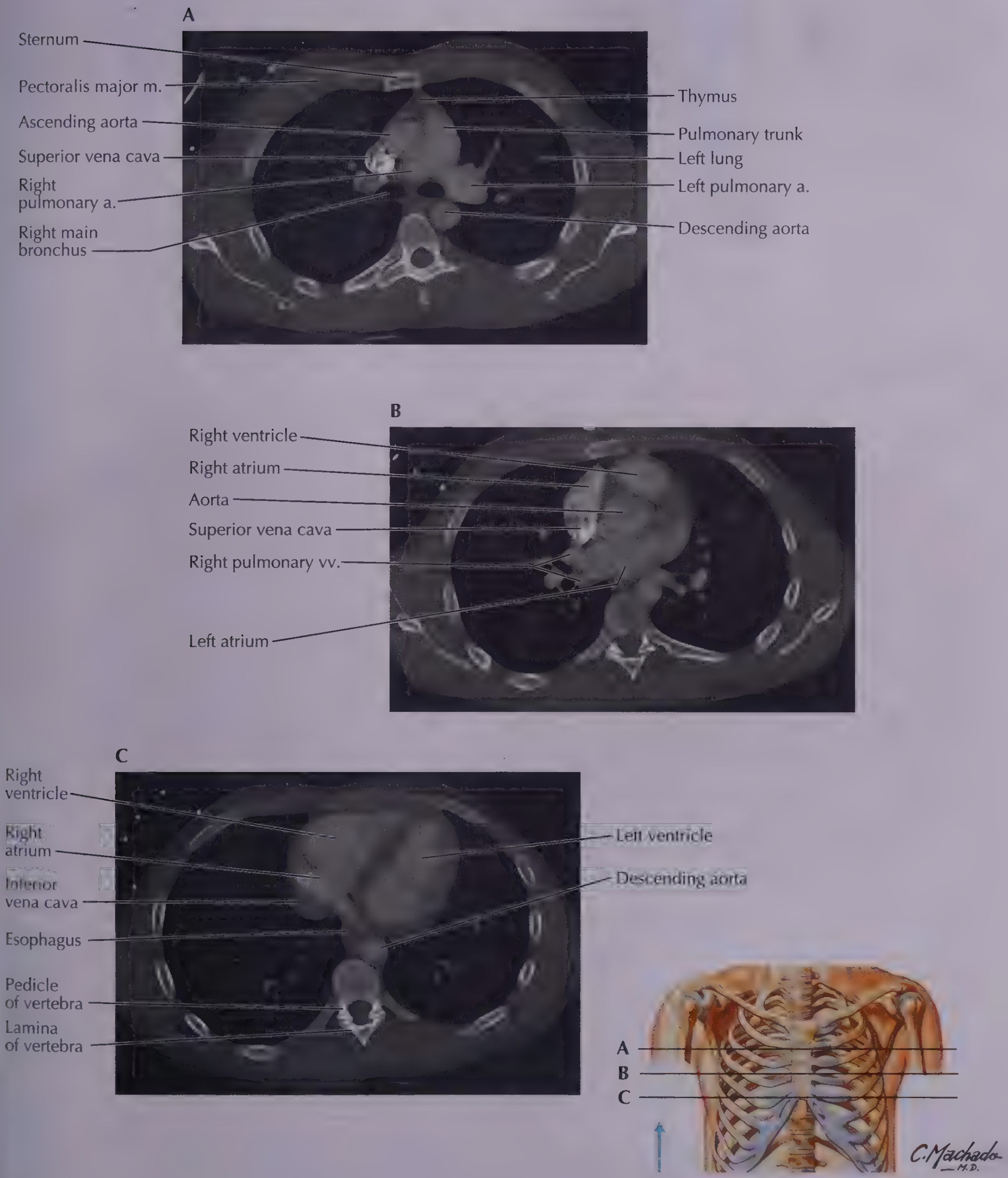
Nerves of Esophagus

See also Plates 320, 321, BP 48

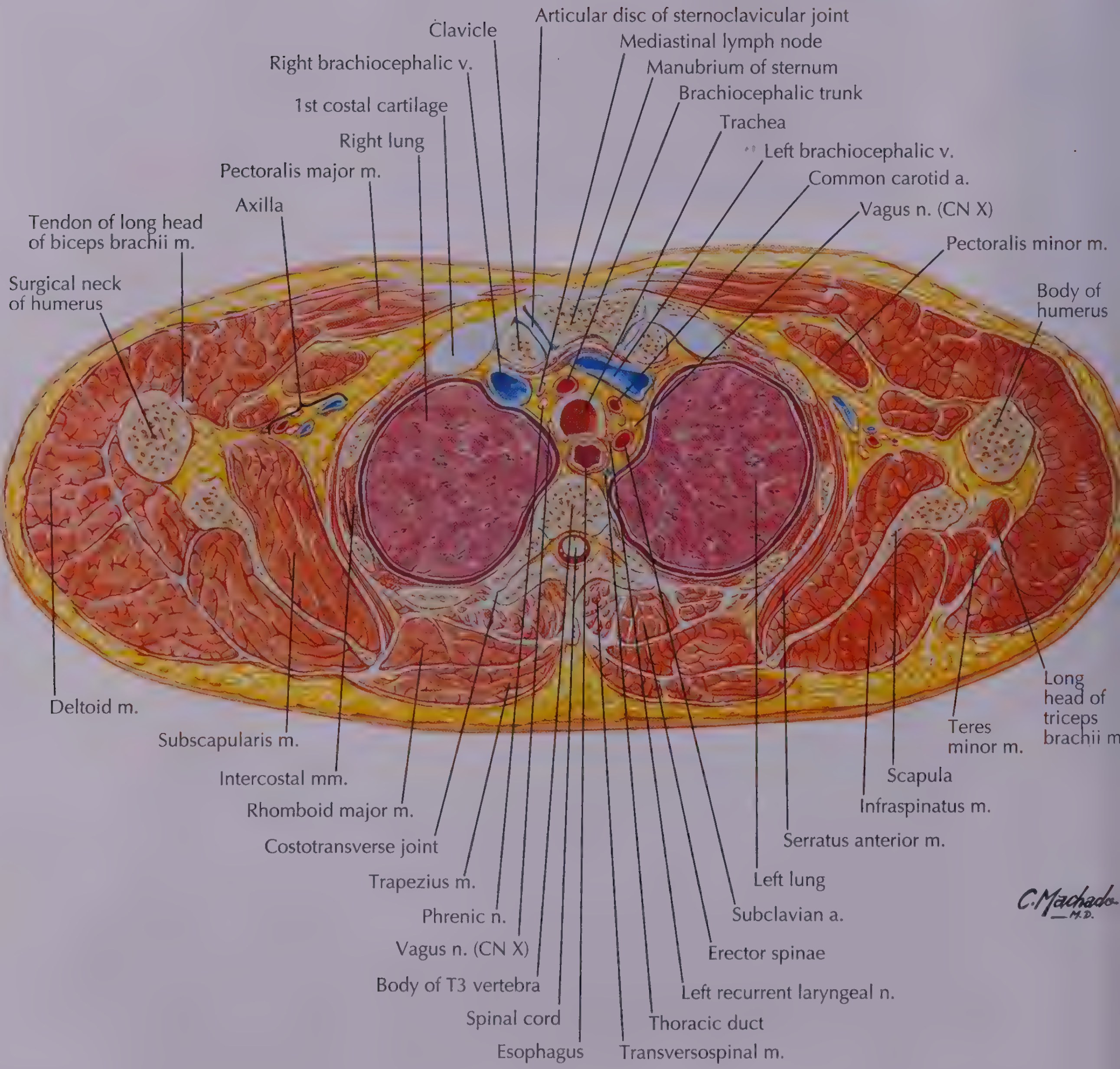

Anterior view
Superior ganglion of vagus n.
Superior cervical ganglion
Inferior ganglion of vagus n.
Pharyngeal branch of vagus n.
Vagus n. (CN X)
Superior laryngeal n.
Sympathetic trunk
Middle cervical ganglion
Cervical cardiac nn. (sympathetic)
Cervical cardiac branches of vagus n.
Vertebral ganglion
Ansa subclavia
Cervicothoracic ganglion (stellate ganglion)
Left recurrent laryngeal n.
Thoracic cardiac branches of vagus n.
Thoracic cardiac n. (sympathetic)
Cardiac plexus
Pulmonary plexuses
Esophageal plexus
Greater thoracic splanchnic n.
Anterior vagal trunk
Hepatic branch of anterior vagal trunk
Anterior n. of lesser curvature
Gastric branches of anterior vagal trunk
Esophagus
Recurrent laryngeal nn.
Right recurrent laryngeal n.
Ansa subclavia
3rd intercostal n.
Gray ramus communicans
White ramus communicans
Thoracic ganglion of sympathetic trunk
Sympathetic trunk
Greater thoracic splanchnic n.
Celiac branch of posterior vagal trunk
Greater thoracic splanchnic nn.
Celiac plexus
Celiac ganglia

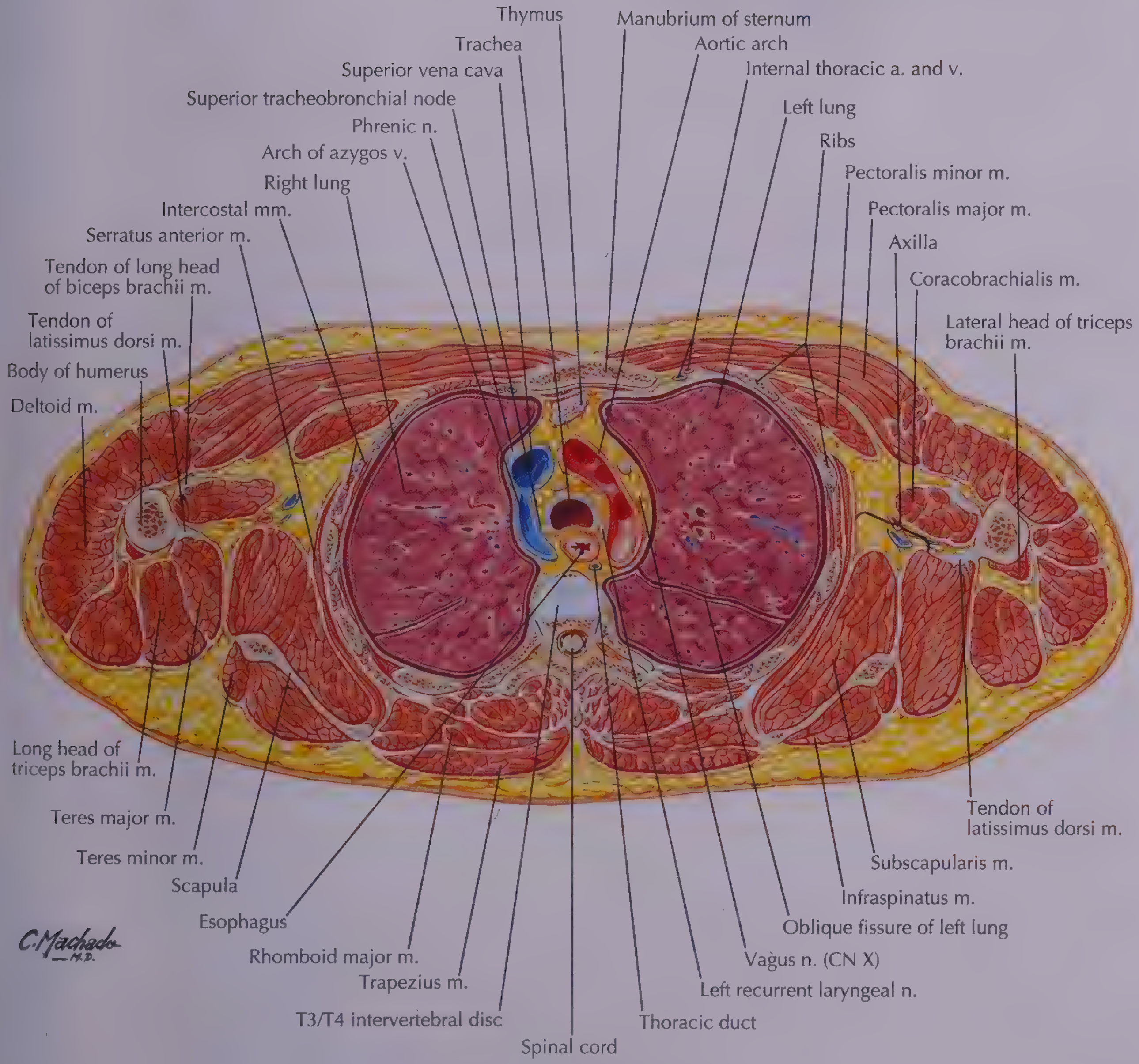

Posterior view
Right vagus n. (CN X)
Esophageal plexus
Posterior vagal trunk
Celiac branch of posterior vagal trunk
Posterior n. of lesser curvature
Gastric branches of posterior vagal trunk

Axial CT images of the thorax from superior (A) to inferior (C)

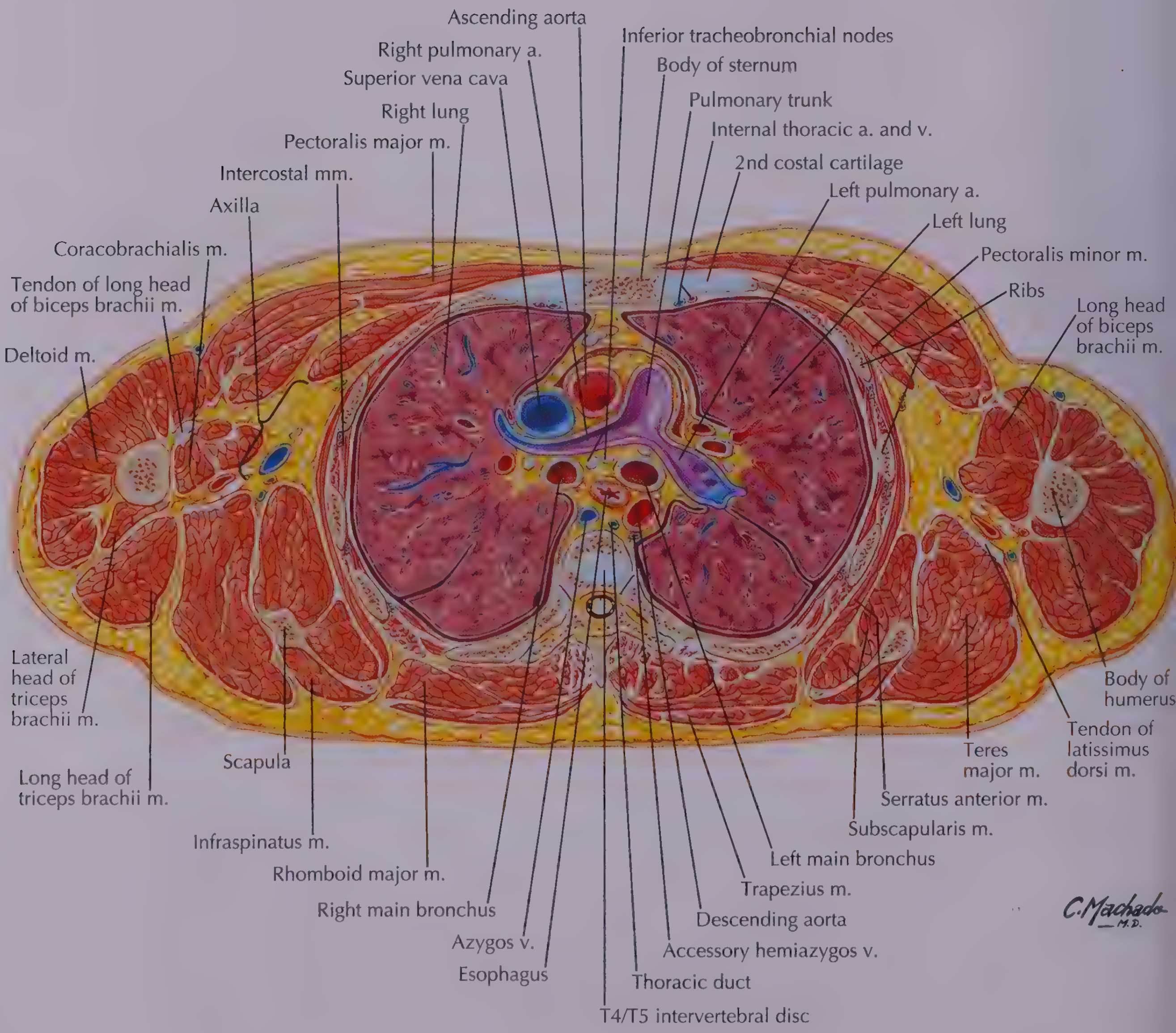

A
Sternum
Pectoralis major m.
Ascending aorta
Superior vena cava
Right pulmonary a.
Right main bronchus
Thymus
Pulmonary trunk
Left lung
Left pulmonary a.
Descending aorta
B
Right ventricle
Right atrium
Aorta
Superior vena cava
Right pulmonary vv.
Left atrium
C
Right ventricle
Right atrium
Inferior vena cava
Esophagus
Pedicle of vertebra
Lamina of vertebra
Left ventricle
Descending aorta
A
B
C
C.Machado M.D.

Cross Section of Thorax at T3 Vertebral Level

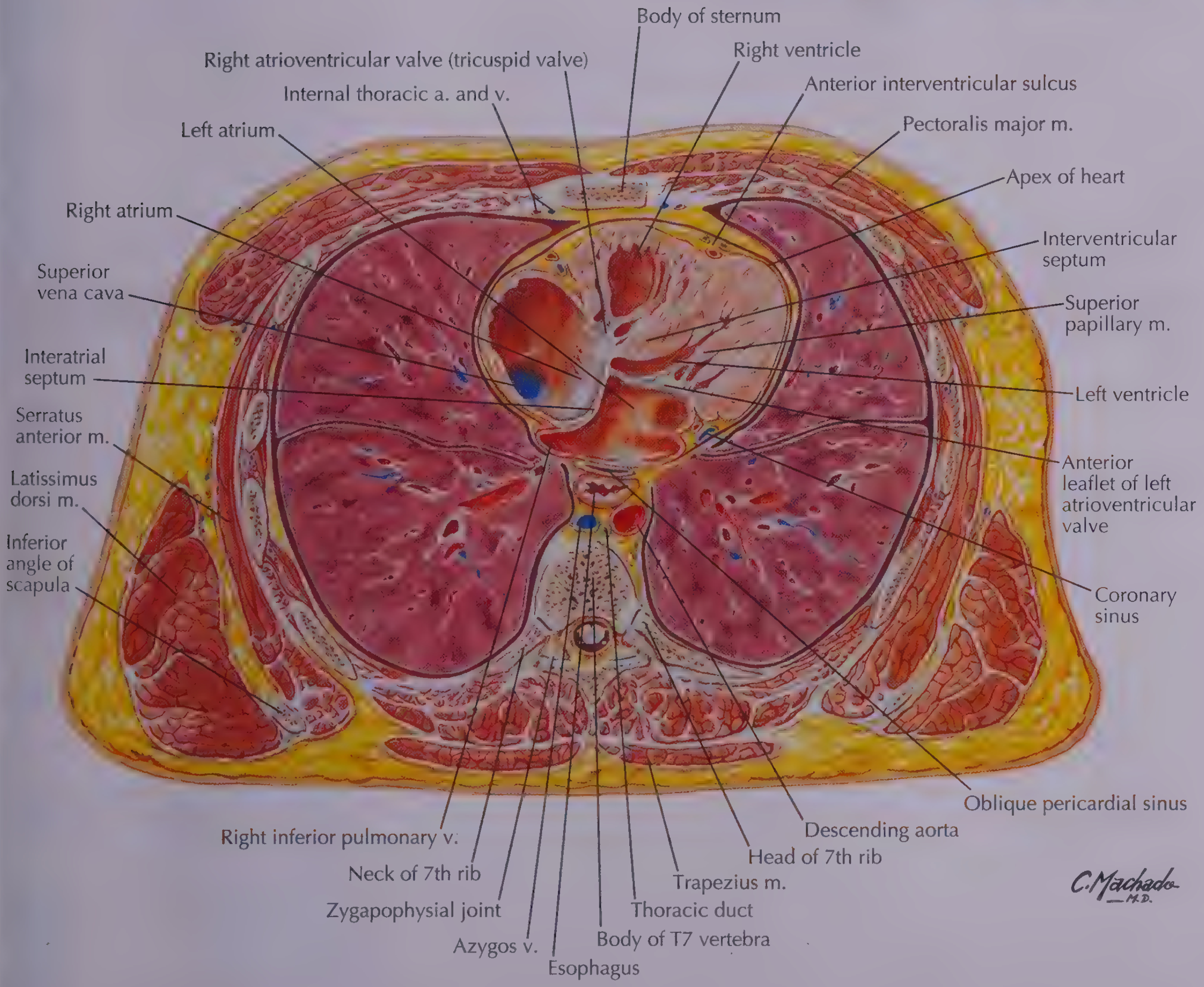

Clavicle
Articular disc of sternoclavicular joint
Right brachiocephalic v.
Mediastinal lymph node
Manubrium of sternum
1st costal cartilage
Brachiocephalic trunk
Right lung
Trachea
Left brachiocephalic v.
Pectoralis major m.
Common carotid a.
Axilla
Vagus n. (CN X)
Tendon of long head of biceps brachii m.
Pectoralis minor m.
Surgical neck of humerus
Body of humerus
Deltoid m.
Subscapularis m.
Intercostal mm.
Rhomboid major m.
Costotransverse joint
Trapezius m.
Phrenic n.
Vagus n. (CN X)
Body of T3 vertebra
Spinal cord
Esophagus
Long head of triceps brachii m
Teres minor m.
Scapula
Infraspinatus m.
Serratus anterior m.
Left lung
Subclavian a.
Erector spinae
Left recurrent laryngeal n.
Thoracic duct
Transversospinal m.


Thymus
Trachea
Superior vena cava
Superior tracheobronchial node
Phrenic n.
Arch of azygos v.
Right lung
Intercostal mm.
Serratus anterior m.
Tendon of long head of biceps brachii m.
Tendon of latissimus dorsi m.
Body of humerus
Deltoid m.
Manubrium of sternum
Aortic arch
Internal thoracic a. and v.
Left lung
Ribs
Pectoralis minor m.
Pectoralis major m.
Axilla
Coracobrachialis m.
Lateral head of triceps brachii m.
Long head of triceps brachii m.
Teres major m.
Teres minor m.
Scapula
Esophagus
Rhomboid major m.
Trapezius m.
T3/T4 intervertebral disc
Spinal cord
Thoracic duct
Left recurrent laryngeal n.
Vagus n. (CN X)
Oblique fissure of left lung
Infraspinatus m.
Subscapularis m.
Tendon of latissimus dorsi m.
C.Machado M.D.

Cross Section of Thorax at T4/T5 Disc Level


Ascending aorta
Right pulmonary a.
Superior vena cava
Right lung
Pectoralis major m.
Intercostal mm.
Axilla
Coracobrachialis m.
Tendon of long head of biceps brachii m.
Deltoid m.
Lateral head of triceps brachii m.
Long head of triceps brachii m.
Scapula
Infraspinatus m.
Rhomboid major m.
Right main bronchus
Azygos v.
Esophagus
T4/T5 intervertebral disc
Thoracic duct
Accessory hemiazygos v.
Descending aorta
Trapezius m.
Left main bronchus
Subscapularis m.
Serratus anterior m.
Teres major m.
Tendon of latissimus dorsi m.
Body of humerus
Long head of biceps brachii m.
Ribs
Pectoralis minor m.
Left lung
Left pulmonary a.
2nd costal cartilage
Internal thoracic a. and v.
Pulmonary trunk
Body of sternum
Inferior tracheobronchial nodes
C.Machado M.D.

Cross Section of Thorax at T7 Vertebral Level


Body of sternum
Right ventricle
Right atrioventricular valve (tricuspid valve)
Internal thoracic a. and v.
Anterior interventricular sulcus
Left atrium
Pectoralis major m.
Apex of heart
Right atrium
Interventricular septum
Superior vena cava
Superior papillary m.
Interatrial septum
Left ventricle
Serratus anterior m.
Latissimus dorsi m.
Anterior leaflet of left atrioventricular valve
Inferior angle of scapula
Coronary sinus
Oblique pericardial sinus
Descending aorta
Right inferior pulmonary v.
Head of 7th rib
Neck of 7th rib
Trapezius m.
Zygapophysial joint
Thoracic duct
Azygos v.
Body of T7 vertebra
Esophagus
C. Machado M.D.

Structures with High* Clinical Significance

ANATOMICAL STRUCTURE	CLINICAL COMMENT	PLATE NUMBERS
Nervous System and Sense Organs		
Long thoracic nerve	May be damaged during chest tube placement or mastectomy, resulting in winged scapula (denervation of serratus anterior muscle)	206, 209
Intercostal nerve	Site of local anesthetic nerve block for procedures such as thoracostomy or to alleviate pain caused by herpes zoster (shingles)	211, 212
Spinal (posterior root) ganglion	Can house dormant varicella zoster virus, which, when activated, can result in herpes zoster (shingles)	212
Phrenic nerve	Surgical injury to phrenic nerve may cause ipsilateral paralysis of diaphragm; diaphragmatic irritation may manifest as shoulder pain because of referral to C3–C5 spinal levels	214, 216, 232
Recurrent laryngeal nerve	The left nerve takes a circuitous path around aorta and may rarely become compressed by large thoracic aortic aneurysm or enlarged left atrium, producing hoarse voice (Ortner's syndrome); more often, these branches are affected by malignancies, such as those of thyroid gland	252, 254
Thoracic cardiac nerves (sympathetic)	Pain of myocardial ischemia referred to upper thoracic dermatomes; may be perceived as somatic pain in thorax and medial upper limb	250
Skeletal System		
Ribs	Rib fractures may cause respiratory dysfunction, predispose to pneumonia, and injure underlying structures (e.g., liver and spleen); severe fractures may breach pleural space and cause pneumothorax; flail chest occurs when multiple fractures in adjacent ribs create "floating" area of thorax with paradoxical motion during inspiration	203
Costochondral and sternochondral (sternocostal) joints	Frequent sites of pain and tenderness after thoracic wall injury or excessive weightlifting (costochondritis); generally reproducible with palpation of joints	204
Clavicles	Common sites of fracture, often after falling onto outstretched limb or onto shoulder; fractures typically occur in middle third; supraclavicular nerve block relieves pain associated with fracture	203
Sternal angle (of Louis)	Surface landmark for counting ribs (2nd pair of ribs articulate between manubrium and body of sternum) and intercostal spaces; divides superior from inferior mediastinum, and marks transition from aortic arch to descending thoracic aorta	203
Superior thoracic aperture	Compression of neurovascular structures (inferior trunk of brachial plexus and great vessels) that traverse superior thoracic aperture may produce thoracic outlet syndrome	213
Intercostal spaces	Relationship of intercostal neurovascular bundle to ribs is crucial when placing chest tube to relieve pneumothorax or hemothorax, or needles to anesthetize nerves; tubes should be inserted along superior margin of ribs to avoid these bundles; of note, however, intercostal nerve may have collateral branch running along superior border of lower rib, which can result in pain	210, 238
Median cricothyroid ligament	Also known as cricothyroid membrane; site of cricothyrotomy, an emergency procedure to establish surgical airway	53, 103
Muscular System		
Diaphragm	Widening of esophageal hiatus at T8 vertebral level or congenital defect allows for protrusion of stomach into thorax (hiatal hernia), which increases incidence of gastroesophageal reflux	216, 257

ANATOMICAL STRUCTURE	CLINICAL COMMENT	PLATE NUMBERS
Cardiovascular System		
Internal thoracic artery	Commonly used for coronary artery bypass grafts, most often for anterior interventricular artery (left anterior descending artery)	211, 212
Pulmonary arteries	Thromboemboli, most often from pelvic and femoral sources, may obstruct pulmonary arteries (pulmonary embolus), leading to hypoxemia, hemodynamic compromise, and pulmonary infarction	220, 227
Pericardium	Pericardial space can contain small amounts of physiologic fluid (15–50 mL); effusion may compromise heart function (cardiac tamponade); pericardial sac can expand and become quite large with slow, progressive fluid accumulation	231, 236
Coronary arteries	Fixed atherosclerotic disease may cause myocardial ischemia to manifest as thoracic pain; rupture and thrombosis of atherosclerotic plaque is main cause of acute myocardial infarction; severity and outcomes depend on amount of myocardium that vessel subtends, with proximal lesions of large vessels being most morbid	239
Pulmonary veins	Atrial fibrillation, a common arrhythmia, is believed to originate from within pulmonary veins; electrical ablation of this arrhythmia creates rings of fibrosis around pulmonary veins as they enter left atrium, thereby preventing propagation of electrical signals into heart	242, 247
Foramen ovale	Provides channel for interatrial flow (right-to-left shunt) during fetal development; remains patent in approximately one in four adults and may provide route for venous microthromboses to enter left side of heart and cause ischemic stroke	242
Interventricular septum	Ventricular septal defect is common congenital cardiac defect, most often involving membranous portion of septum; myocardial infarction in territory of anterior interventricular artery (left anterior descending artery), especially if not promptly treated, may generate sufficient ischemia of septum to cause perforation	242, 245
Heart valves	Valvular disease (e.g., aortic stenosis, mitral insufficiency) is common, especially among older adults, and may cause progressive heart failure	243
Aortic valve	1% of population has bicuspid aortic valve (i.e., containing two rather than three leaflets), which predisposes to aortic stenosis and insufficiency and is also associated with aortic aneurysm	243, 244
Sinuatrial node	Primary cardiac pacemaker, which generates action potentials that propagate through cardiac conduction system; aging, infiltrative diseases, and heart surgery may cause sinus node dysfunction, resulting in bradycardia	248
Atrioventricular node	Conducts action potentials from atria to ventricles; intrinsic refractory period prevents rapid atrial rhythms from causing equivalent tachycardia of ventricles; dysfunction secondary to fibrosis, medications, cardiac surgery may result in heart block; when block is complete, atria and ventricles have independent rhythms	248
Ligamentum arteriosum	Remnant of ductus arteriosus, which connects pulmonary and systemic circulations during fetal development; lack of ductus closure after birth may cause exertional dyspnea, pulmonary vascular disease, or heart failure; acts as landmark to identify left recurrent laryngeal nerve looping inferior to ligament	232, 247
Thoracic aorta	Lies naturally to left of vertebral column in thorax and commences at T4 vertebral level, where aortic arch terminates; congenital coarctation (narrowing) of aorta may cause hypertension in children and young adults; significant difference in blood pressure between upper and lower extremities is suggestive	258
Thoracic aorta	Aneurysm (enlargement) may occur secondary to age and atherosclerotic risk factors (such as tobacco abuse and hypertension), connective tissue disorders, in association with bicuspid aortic valve, or from infection (e.g., syphilis). Large aneurysm can rupture or dissect; the latter occurs when a tear in intimal layer allows blood to propagate into a false lumen between intima and media	258

Structures with High* Clinical Significance

ANATOMICAL STRUCTURE	CLINICAL COMMENT	PLATE NUMBERS
Cardiovascular System—Continued		
Azygos vein	Drains posterior thorax and provides important collateral channel between inferior vena cava and superior vena cava	259
Lymph Vessels and Lymphoid Organs		
Lymph vessels of breast	Metastatic spread of cancer cells from mammary gland to axilla and thorax via lymphatics draining breast	208
Axillary nodes	Primary nodes that receive lymphatic drainage from upper limb, thoracic wall, and breast; commonly enlarged in patients with breast cancer	207, 208
Respiratory System		
Pleura	Air or gas (spontaneous or traumatic) can leak into pleural space between visceral pleura and parietal pleura and compress lung, a condition known as pneumothorax; if severe enough to compromise venous return to heart, resulting in hypotension and dyspnea, condition is known as tension pneumothorax	217–220
Cervical pleura	Extends into neck superior to anterior aspect of angled 1st rib or to level of 1st rib posteriorly; it may therefore be punctured during neck procedures, producing pneumothorax	69, 217
Tracheal bifurcation	Important landmark when assessing position of endotracheal tube, which should terminate 4–5 cm above; often at T4–T5 vertebral level; right main bronchus is shorter, more vertical, and wider; therefore, aspirated objects more often enter right side; left main bronchus lies over esophagus and posterior to left atrium of heart	225
Apex of lung	Pancoast tumor (bronchogenic carcinoma of apex of lung) may compress sympathetic trunk, resulting in Horner's syndrome (ipsilateral miosis, ptosis, anhidrosis, facial flushing); apex is susceptible to pneumothorax from needles introduced in lower neck region	217, 251
Reproductive System		
Mammary gland	Breast cancer is most common malignancy in women; most common type originates in lactiferous duct and can either be localized within duct (ductal carcinoma in situ) or invasive into adjoining tissues (invasive ductal carcinoma)	205

*Selections were based largely on clinical data and commonly discussed clinical correlations in macroscopic ("gross") anatomy courses.

MUSCLE	MUSCLE GROUP	ORIGIN ATTACHMENT	INSERTION ATTACHMENT	INNERVATION	BLOOD SUPPLY	MAIN ACTIONS
Diaphragm	Diaphragm	Xiphoid process, costal cartilages 7–12, L1–L3 vertebrae	Central tendon	Phrenic nerve	Pericardiacophrenic, musculophrenic, posterior intercostal, and superior and inferior phrenic arteries	Draws central tendon down and forward during inspiration
External intercostal mm.	Thoracic wall	Lower borders of ribs	Upper borders of subjacent ribs	Intercostal nerves	Posterior intercostal arteries, supreme intercostal artery, internal thoracic artery, musculophrenic artery	Support intercostal spaces in inspiration and expiration, elevate ribs in inspiration
Innermost intercostal mm.	Thoracic wall	Lower borders of ribs	Upper borders of subjacent ribs	Intercostal nerves	Posterior intercostal arteries, supreme intercostal artery, internal thoracic artery, musculophrenic artery	Prevent pushing out or drawing in of intercostal spaces in inspiration and expiration, lower ribs in forced expiration
Internal intercostal mm.	Thoracic wall	Costal grooves, lower borders of costal cartilages	Upper borders of subjacent ribs	Intercostal nerves	Posterior intercostal arteries, supreme intercostal artery, internal thoracic artery, musculophrenic artery	Prevent pushing out or drawing in of intercostal spaces in inspiration and expiration, lower ribs in forced expiration
Levatores costarum	Thoracic wall	Transverse processes of C7–T11 vertebrae	Subjacent ribs (between tubercle and angle)	Posterior rami of thoracic spinal nerves	Posterior intercostal arteries	Elevate ribs
Pectoralis major m.	Pectoral region	*Clavicular part:* sternal half of clavicle *Sternal part:* anterior surface of sternum, cartilages of true ribs *Abdominal part:* aponeurosis of external abdominal oblique muscle	Lateral lip of intertubercular sulcus of humerus	Medial and lateral pectoral nerves	Pectoral branch of thoracoacromial artery, internal thoracic artery	Flexes, adducts, and medially rotates arm
Pectoralis minor m.	Pectoral region	External surface of upper margin of ribs 3–5	Coracoid process of scapula	Medial and lateral pectoral nerves	Pectoral branch of thoracoacromial artery, superior and lateral thoracic arteries	Lowers lateral angle of scapula and protracts scapula
Serratus anterior m.	Shoulder	Lateral surfaces of ribs 1–9	Costal surface of medial border of scapula	Long thoracic nerve	Lateral thoracic artery	Protracts and rotates scapula and holds it against thoracic wall
Subclavius m.	Shoulder	Upper border of 1st rib and costal cartilage	Inferior surface of middle one-third of clavicle	Subclavian nerve	Clavicular branch of thoracoacromial artery	Anchors and depresses clavicle
Subcostal mm.	Thoracic wall	Internal surfaces of lower ribs near their angles	Superior borders of ribs that are the 2nd or 3rd below the muscle origin	Intercostal nerves	Posterior intercostal arteries, musculophrenic artery	Depress ribs
Transversus thoracis m.	Thoracic wall	Internal surfaces of costal cartilages 2–6	Posterior surface of lower sternum	Intercostal nerves	Internal thoracic artery	Depresses ribs and costal cartilages

Variations in spinal nerve contributions to the innervation of muscles, their arterial supply, their attachments, and their actions are common themes in human anatomy. Therefore, expect differences between texts and realize that anatomical variation is normal.

ABDOMEN

5

Surface Anatomy 267
Abdominal Wall 268–287
Peritoneal Cavity 288–293
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Regional Imaging 345–346
Cross-Sectional Anatomy 347–351
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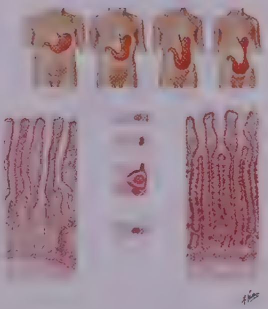
Muscles Table 5.4
Electronic Bonus Plates BP 53–BP 83

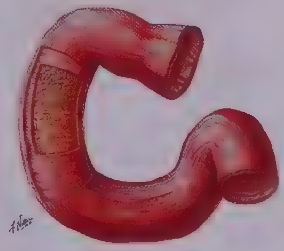
ELECTRONIC BONUS PLATES

BP 53 Inguinal and Femoral Regions

BP 54 Indirect Inguinal Hernia



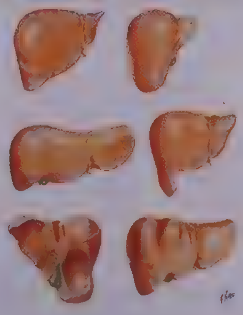
BP 55 Variations in Position and Contour of Stomach in Relation to Body Habitus



BP 56 Layers of Duodenal Wall

BP 57 CT and MRCP Showing Vermiform Appendix, Gallbladder, and Ducts; Nerve Branches on Hepatic Artery

BP 58 Topography of Liver



BP 59 Variations in Form of Liver

BP 60 Sigmoid Colon: Variations in Position

ELECTRONIC BONUS PLATES—*cont'd*

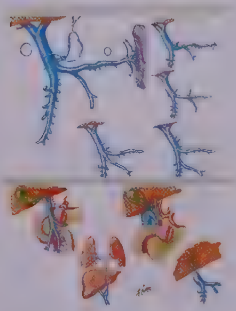
BP 61 Variations in Arterial Supply to Cecum and Posterior Peritoneal Attachment of Cecum

BP 62 Variations in Pancreatic Duct

BP 63 Variations in Cystic, Hepatic, and Pancreatic Ducts

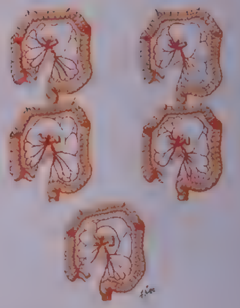
BP 64 Variations in Cystic Arteries

BP 65 Variations in Hepatic Arteries



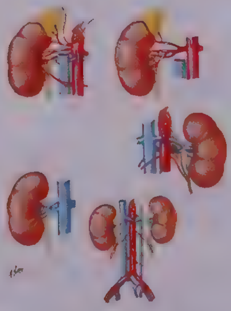
BP 66 Variations and Anomalies of Hepatic Portal Vein

BP 67 Variations in Celiac Trunk

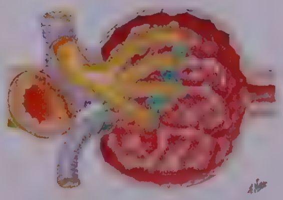


BP 68 Variations in Colic Arteries

BP 69 Variations in Colic Arteries (continued)



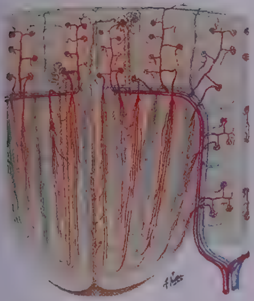
BP 70 Variations in Renal Artery and Vein



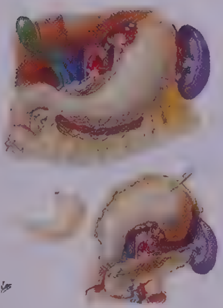
BP 71 Histology of Renal Corpuscle

BP 72 Nephron and Collecting Tubule: Schema

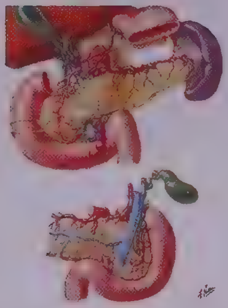
ELECTRONIC BONUS PLATES—*cont'd*



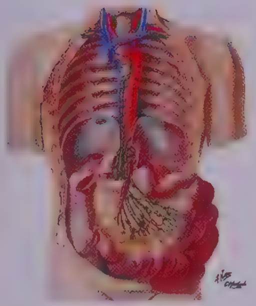
BP 73 Blood Vessels in Parenchyma of Kidney: Schema



BP 74 Lymph Vessels and Lymph Nodes of Stomach



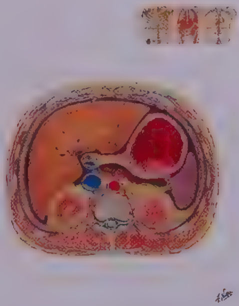
BP 75 Lymph Vessels and Lymph Nodes of Pancreas



BP 76 Lymph Vessels and Lymph Nodes of Small Intestine

BP 77 Lymph Vessels and Lymph Nodes of Large Intestine

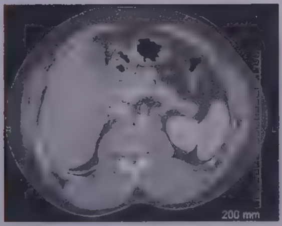
BP 78 Lymph Vessels and Lymph Nodes of Liver



BP 79 Schematic Cross Section of Abdomen at T12 Vertebral Level

BP 80 Transverse Section of Abdomen: L5 Vertebral Level, Near Transtubercular Plane

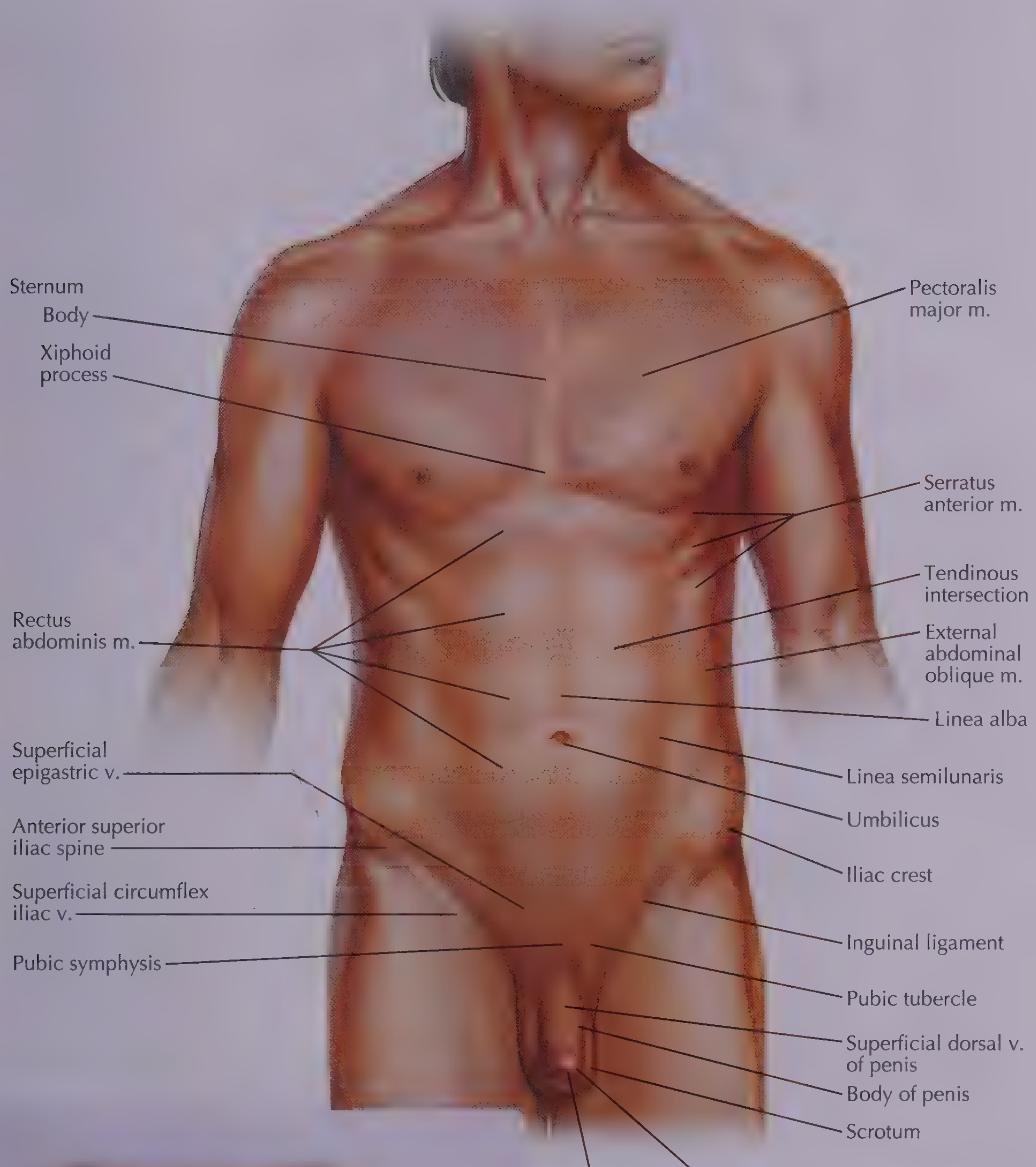
BP 81 Transverse Section of Abdomen: S1 Vertebral Level, Anterior Superior Iliac Spine

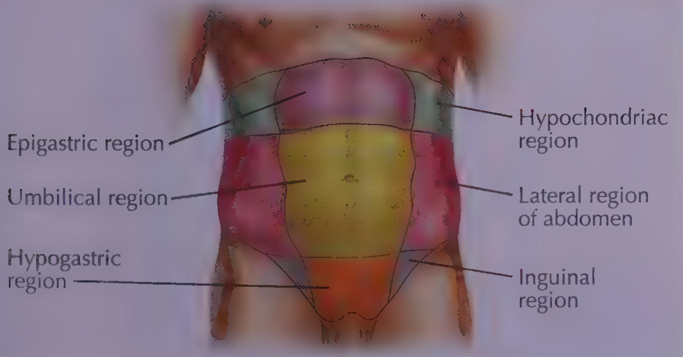


BP 82 Axial CT Image of Upper Abdomen

BP 83 Arterial Variations and Collateral Supply of Liver and Gallbladder

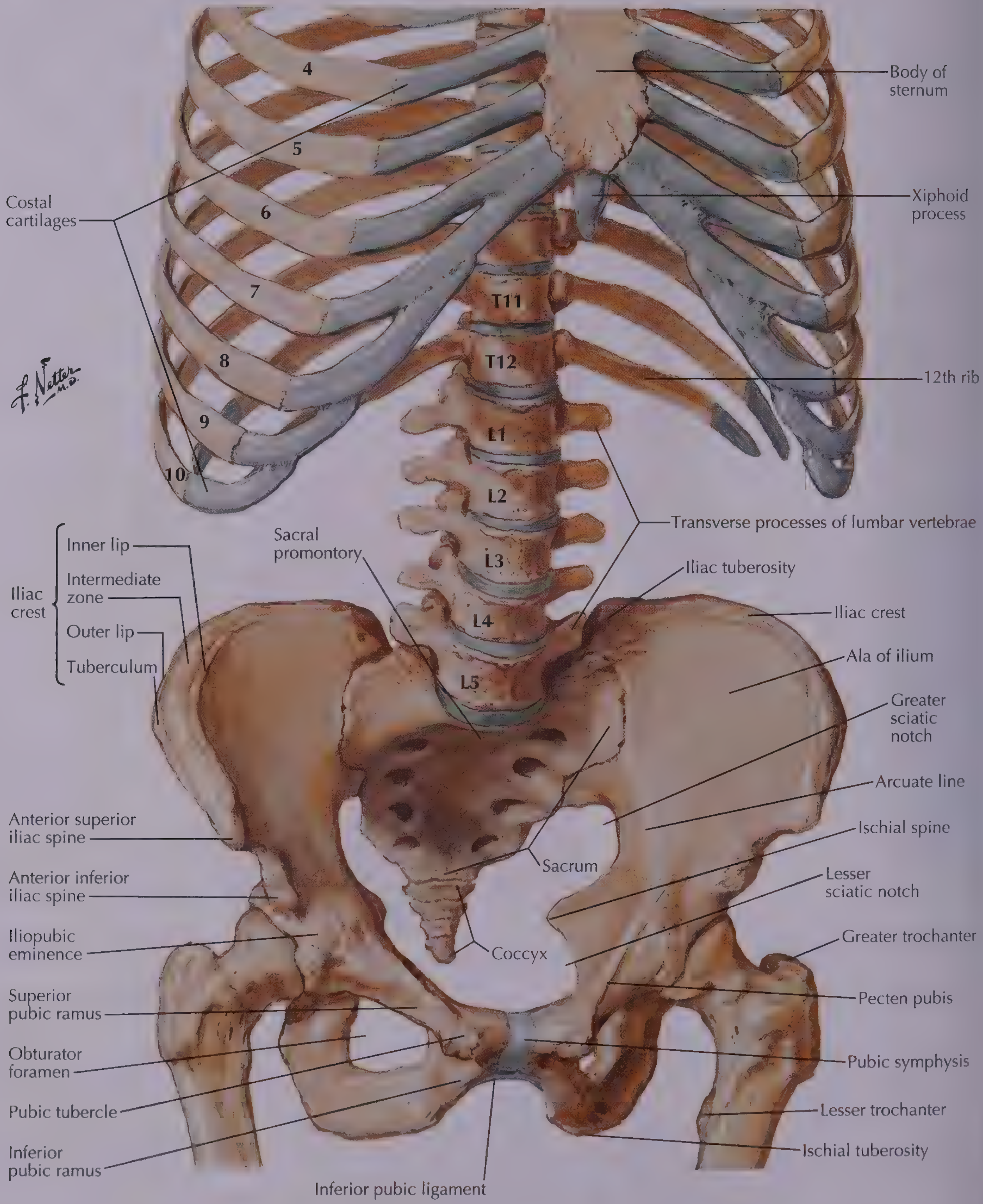
See also Plates 188, 270


Sternum
Body
Xiphoid process
Rectus abdominis m.
Superficial epigastric v.
Anterior superior iliac spine
Superficial circumflex iliac v.
Pubic symphysis
Pectoralis major m.
Serratus anterior m.
Tendinous intersection
External abdominal oblique m.
Linea alba
Linea semilunaris
Umbilicus
Iliac crest
Inguinal ligament
Pubic tubercle
Superficial dorsal v. of penis
Body of penis
Scrotum
Glans penis
External urethral orifice
C. Machado M.D.


Epigastric region
Umbilical region
Hypogastric region
Hypochondriac region
Lateral region of abdomen
Inguinal region

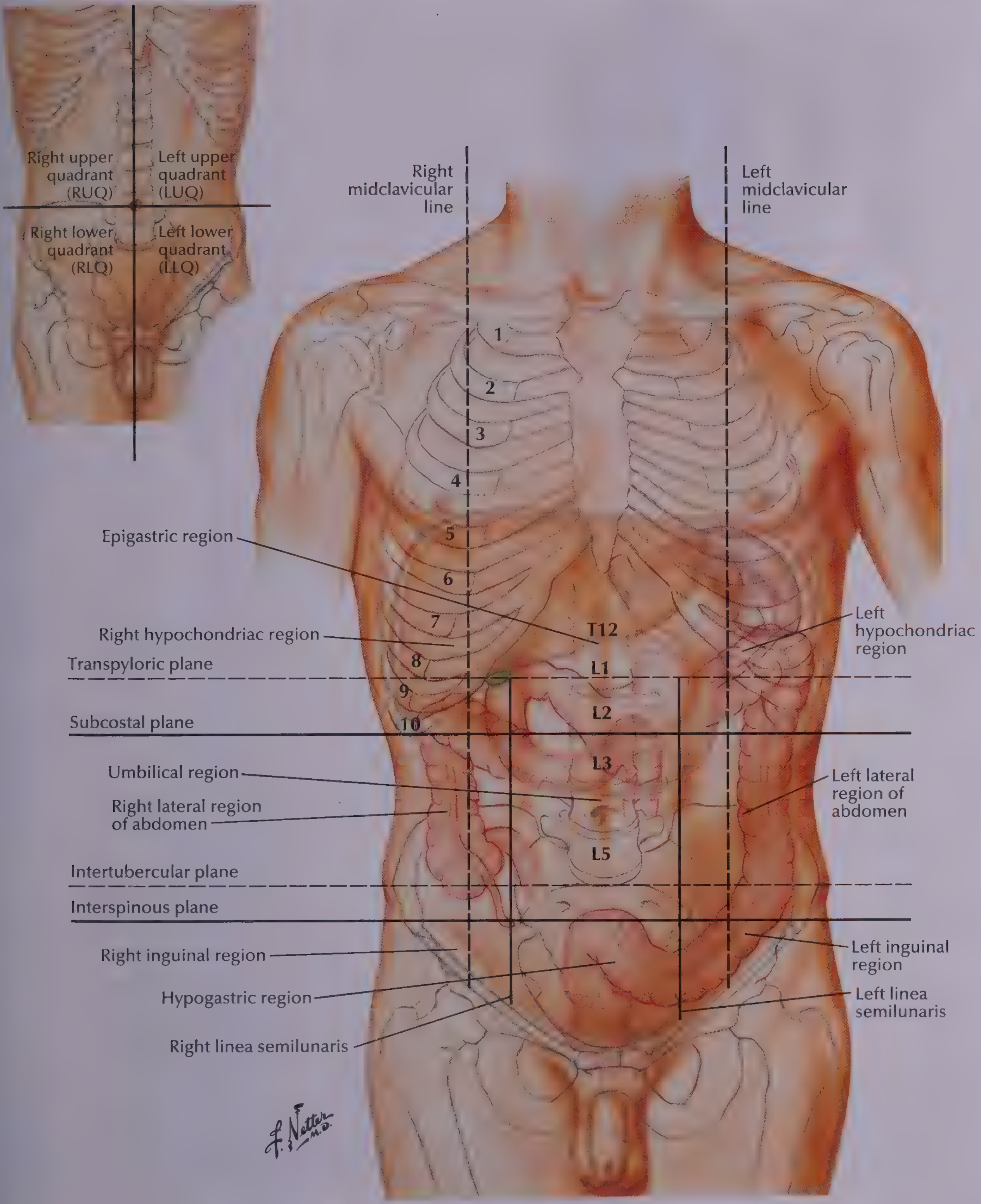
Bony Framework of Abdomen

See also Plates 203, 353


4
5
6
7
8
9
10
Body of sternum
Xiphoid process
Costal cartilages
T11
T12
12th rib
F. Netter M.D.
L1
L2
L3
L4
L5
Transverse processes of lumbar vertebrae
Iliac crest
Inner lip
Intermediate zone
Outer lip
Tuberculum
Sacral promontory
Iliac tuberosity
Iliac crest
Ala of ilium
Greater sciatic notch
Arcuate line
Ischial spine
Anterior superior iliac spine
Sacrum
Lesser sciatic notch
Anterior inferior iliac spine
Greater trochanter
Iliopubic eminence
Coccyx
Pecten pubis
Superior pubic ramus
Obturator foramen
Pubic symphysis
Pubic tubercle
Lesser trochanter
Ischial tuberosity
Inferior pubic ramus
Inferior pubic ligament

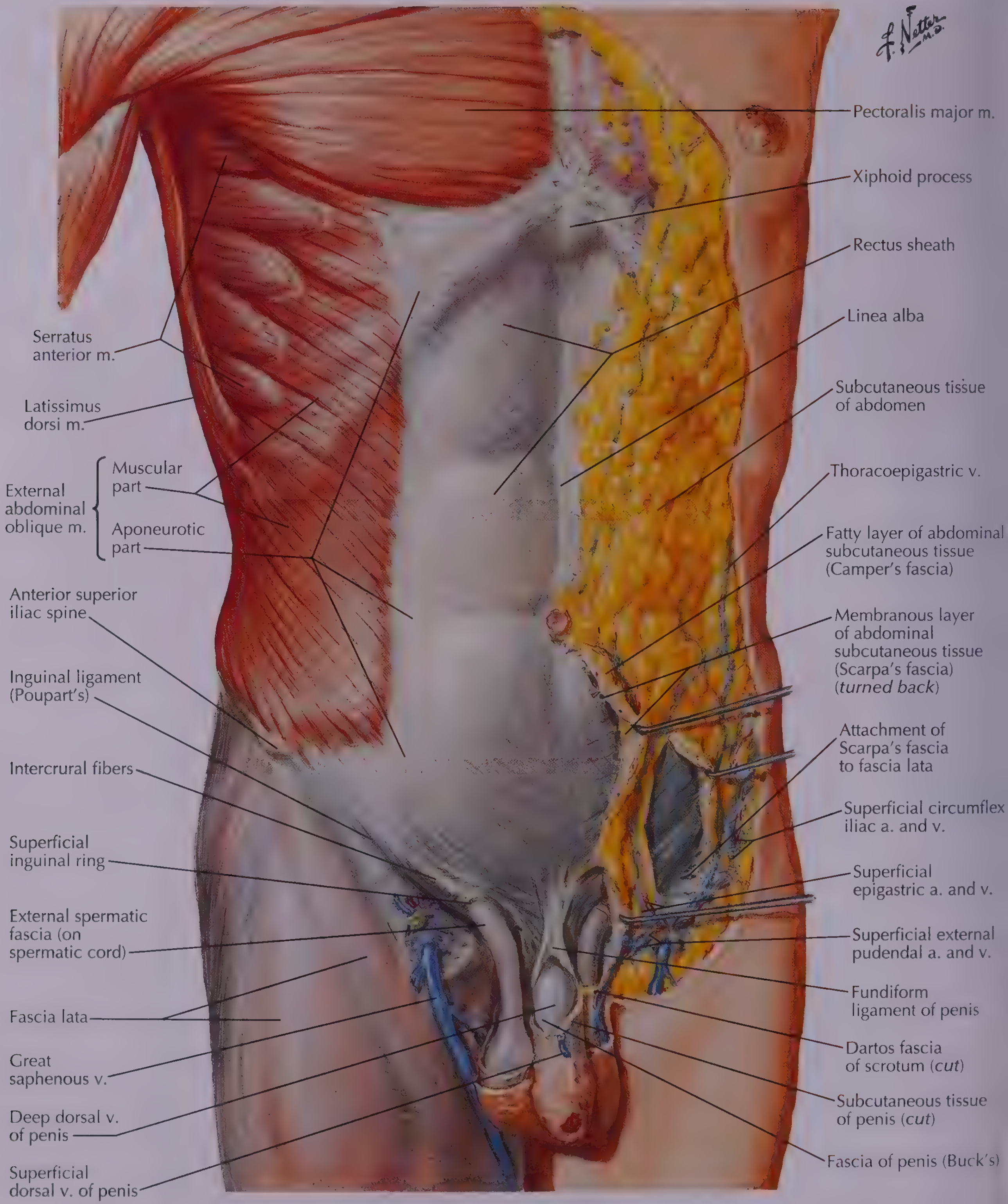
Regions and Planes of Abdomen

See also Plates 217, BP 70

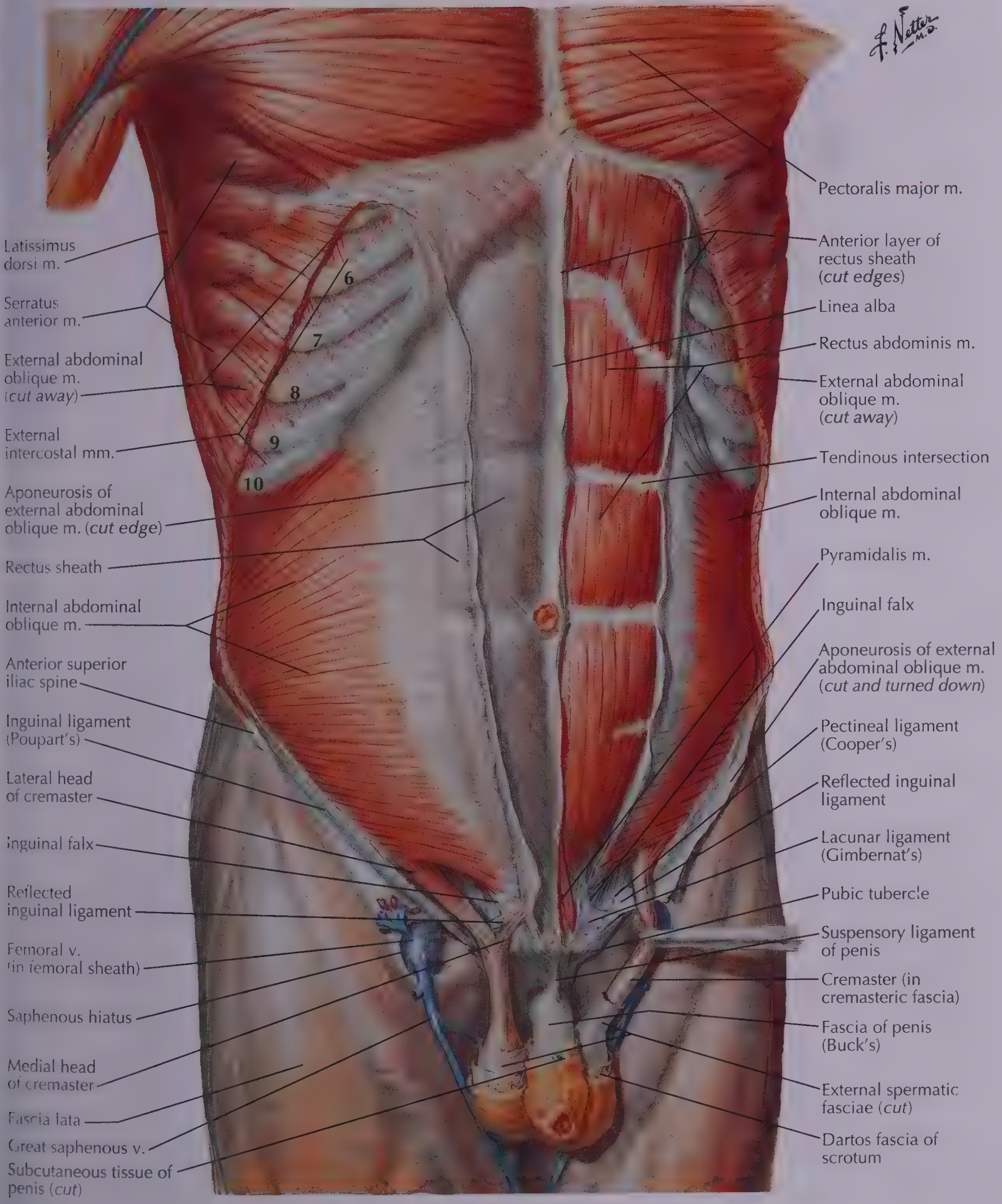

Right upper quadrant (RUQ)
Left upper quadrant (LUQ)
Right lower quadrant (RLQ)
Left lower quadrant (LLQ)
Right midclavicular line
Left midclavicular line
1
2
3
4
5
6
7
8
9
10
Epigastric region
T12
Left hypochondriac region
Right hypochondriac region
Transpyloric plane
L1
L2
Subcostal plane
L3
Umbilical region
Left lateral region of abdomen
Right lateral region of abdomen
L5
Intertubercular plane
Interspinous plane
Right inguinal region
Left inguinal region
Hypogastric region
Left linea semilunaris
Right linea semilunaris
F. Netter M.D.

Anterior Abdominal Wall: Superficial Dissection

See also Plates 277, 352, BP 53

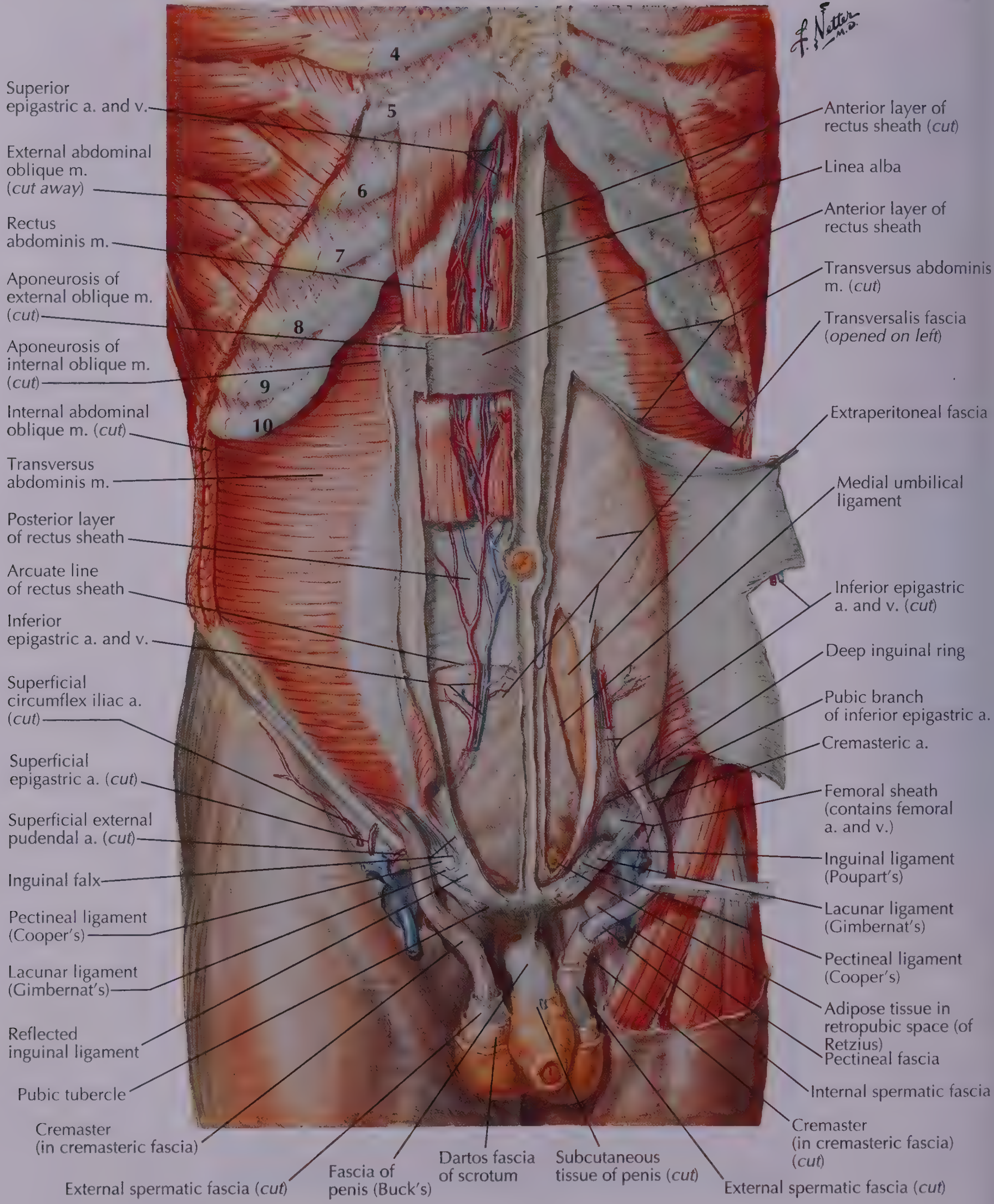

Serratus anterior m.
Latissimus dorsi m.
External abdominal oblique m.
Muscular part
Aponeurotic part
Anterior superior iliac spine
Inguinal ligament (Poupart's)
Intercrural fibers
Superficial inguinal ring
External spermatic fascia (on spermatic cord)
Fascia lata
Great saphenous v.
Deep dorsal v. of penis
Superficial dorsal v. of penis
Pectoralis major m.
Xiphoid process
Rectus sheath
Linea alba
Subcutaneous tissue of abdomen
Thoracoepigastric v.
Fatty layer of abdominal subcutaneous tissue (Camper's fascia)
Membranous layer of abdominal subcutaneous tissue (Scarpa's fascia) (*turned back*)
Attachment of Scarpa's fascia to fascia lata
Superficial circumflex iliac a. and v.
Superficial epigastric a. and v.
Superficial external pudendal a. and v.
Fundiform ligament of penis
Dartos fascia of scrotum (*cut*)
Subcutaneous tissue of penis (*cut*)
Fascia of penis (Buck's)
F. Netter M.D.

See also Plates 209, 210, BP 53

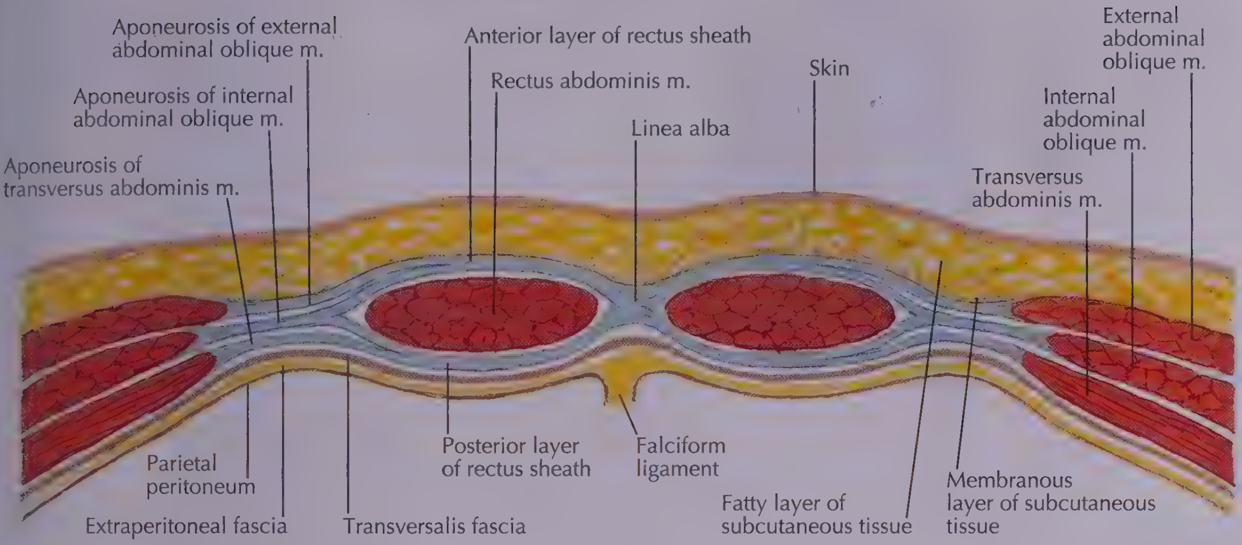

Pectoralis major m.
Anterior layer of rectus sheath (*cut edges*)
Linea alba
Rectus abdominis m.
External abdominal oblique m. (*cut away*)
Tendinous intersection
Internal abdominal oblique m.
Pyramidalis m.
Inguinal falx
Aponeurosis of external abdominal oblique m. (*cut and turned down*)
Pectineal ligament (Cooper's)
Reflected inguinal ligament
Lacunar ligament (Gimbernat's)
Pubic tubercle
Suspensory ligament of penis
Cremaster (in cremasteric fascia)
Fascia of penis (Buck's)
External spermatic fasciae (*cut*)
Dartos fascia of scrotum
Latissimus dorsi m.
Serratus anterior m.
External abdominal oblique m. (*cut away*)
External intercostal mm.
Aponeurosis of external abdominal oblique m. (*cut edge*)
Rectus sheath
Internal abdominal oblique m.
Anterior superior iliac spine
Inguinal ligament (Poupart's)
Lateral head of cremaster
Inguinal falx
Reflected inguinal ligament
Femoral v. (in femoral sheath)
Saphenous hiatus
Medial head of cremaster
Fascia lata
Great saphenous v.
Subcutaneous tissue of penis (*cut*)
6
7
8
9
10
F. Netter M.D.

Anterior Abdominal Wall: Deep Dissection

See also Plates 210, 276, BP 54

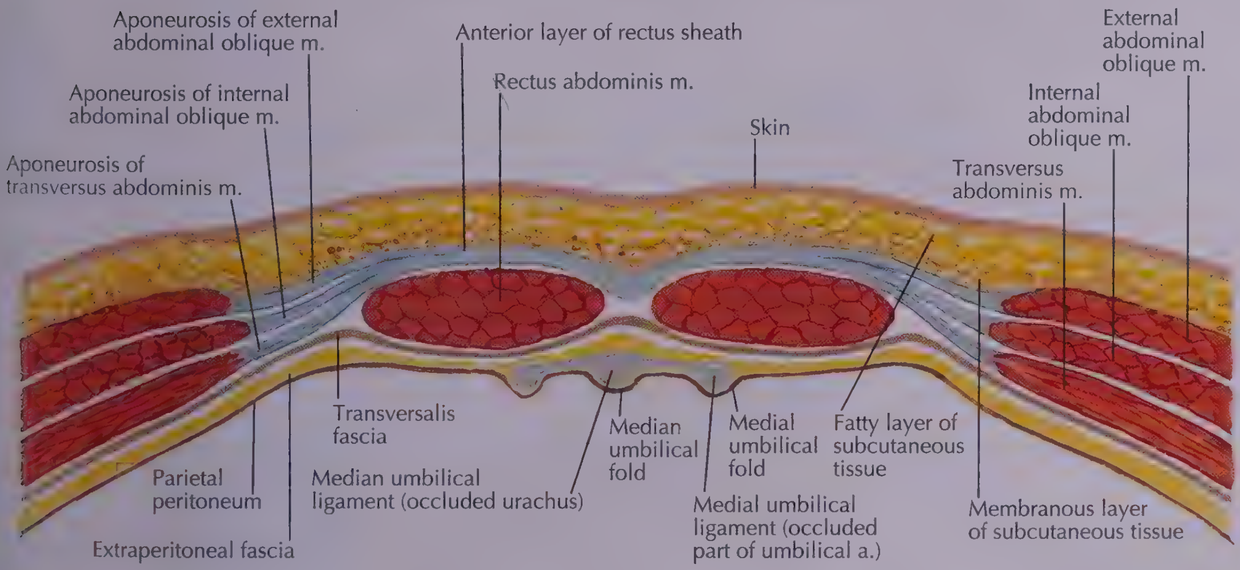

4
5
6
7
8
9
10
Superior epigastric a. and v.
External abdominal oblique m. (*cut away*)
Rectus abdominis m.
Aponeurosis of external oblique m. (*cut*)
Aponeurosis of internal oblique m. (*cut*)
Internal abdominal oblique m. (*cut*)
Transversus abdominis m.
Posterior layer of rectus sheath
Arcuate line of rectus sheath
Inferior epigastric a. and v.
Superficial circumflex iliac a. (*cut*)
Superficial epigastric a. (*cut*)
Superficial external pudendal a. (*cut*)
Inguinal falx
Pectineal ligament (Cooper's)
Lacunar ligament (Gimbernat's)
Reflected inguinal ligament
Pubic tubercle
Cremaster (in cremasteric fascia)
External spermatic fascia (*cut*)
Fascia of penis (Buck's)
Dartos fascia of scrotum
Subcutaneous tissue of penis (*cut*)
External spermatic fascia (*cut*)
Cremaster (in cremasteric fascia) (*cut*)
Internal spermatic fascia
Pectineal fascia
Adipose tissue in retropubic space (of Retzius)
Pectineal ligament (Cooper's)
Lacunar ligament (Gimbernat's)
Inguinal ligament (Poupart's)
Femoral sheath (contains femoral a. and v.)
Cremasteric a.
Pubic branch of inferior epigastric a.
Deep inguinal ring
Inferior epigastric a. and v. (*cut*)
Medial umbilical ligament
Extraperitoneal fascia
Transversalis fascia (*opened on left*)
Transversus abdominis m. (*cut*)
Anterior layer of rectus sheath
Linea alba
Anterior layer of rectus sheath (*cut*)
F. Netter M.D.

Section superior to arcuate line of rectus sheath


Aponeurosis of external abdominal oblique m.
Aponeurosis of internal abdominal oblique m.
Aponeurosis of transversus abdominis m.
Anterior layer of rectus sheath
Rectus abdominis m.
Linea alba
Skin
External abdominal oblique m.
Internal abdominal oblique m.
Transversus abdominis m.
Parietal peritoneum
Extraperitoneal fascia
Transversalis fascia
Posterior layer of rectus sheath
Falciform ligament
Fatty layer of subcutaneous tissue
Membranous layer of subcutaneous tissue

Aponeurosis of internal abdominal oblique muscle splits to form anterior and posterior layers of rectus sheath. Aponeurosis of external abdominal oblique muscle joins anterior layer; aponeurosis of transversus abdominis muscle joins posterior layer. Anterior and posterior layers of rectus sheath unite medially to form linea alba.

Section inferior to arcuate line of rectus sheath

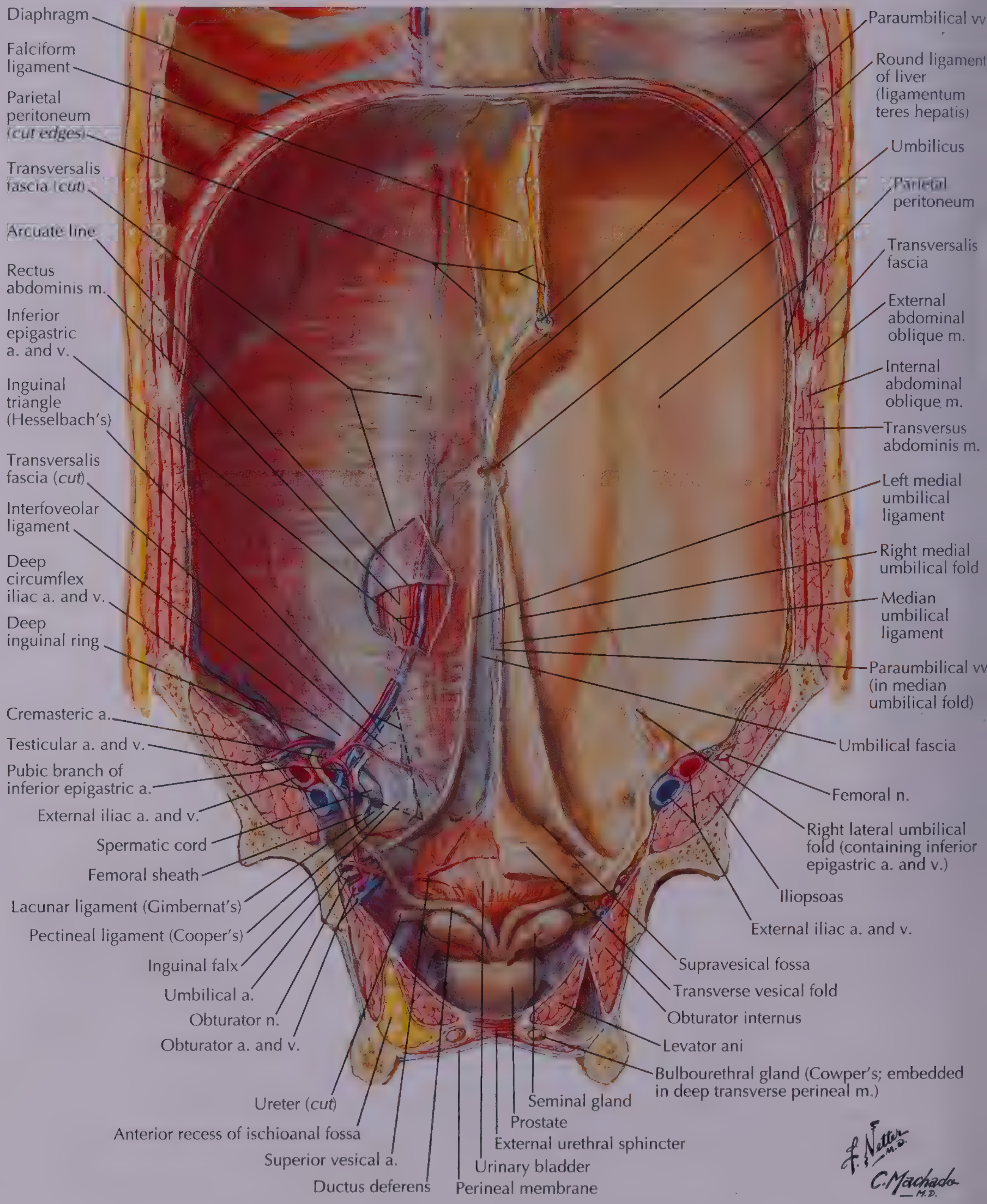

Aponeurosis of external abdominal oblique m.
Aponeurosis of internal abdominal oblique m.
Aponeurosis of transversus abdominis m.
Anterior layer of rectus sheath
Rectus abdominis m.
Skin
External abdominal oblique m.
Internal abdominal oblique m.
Transversus abdominis m.
Transversalis fascia
Parietal peritoneum
Median umbilical ligament (occluded urachus)
Extraperitoneal fascia
Median umbilical fold
Medial umbilical fold
Medial umbilical ligament (occluded part of umbilical a.)
Fatty layer of subcutaneous tissue
Membranous layer of subcutaneous tissue

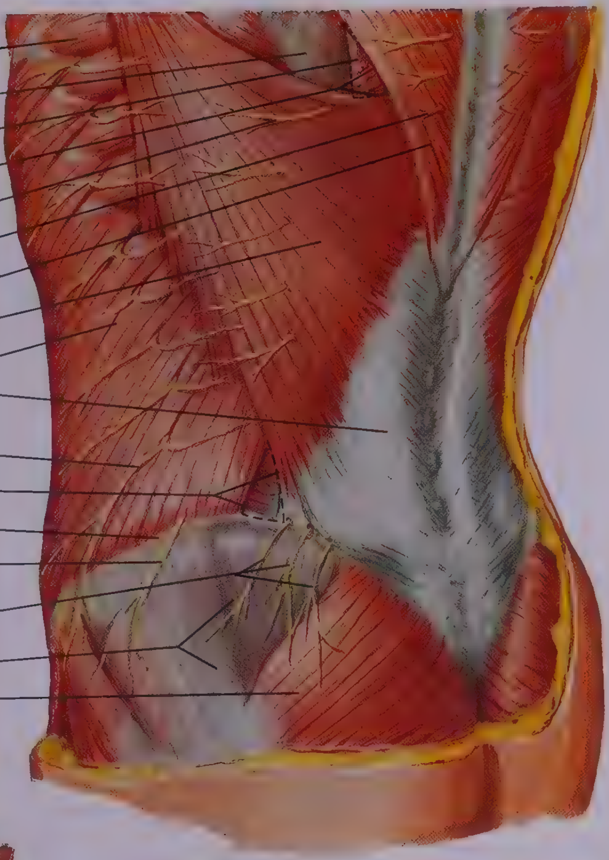
Aponeurosis of internal abdominal oblique muscle does not split at this level but passes completely anterior to rectus abdominis muscle and is fused there with both the aponeurosis of external abdominal oblique muscle and that of transversus abdominis muscle. Thus, the posterior layer of the rectus sheath is absent below arcuate line, leaving only transversalis fascia.

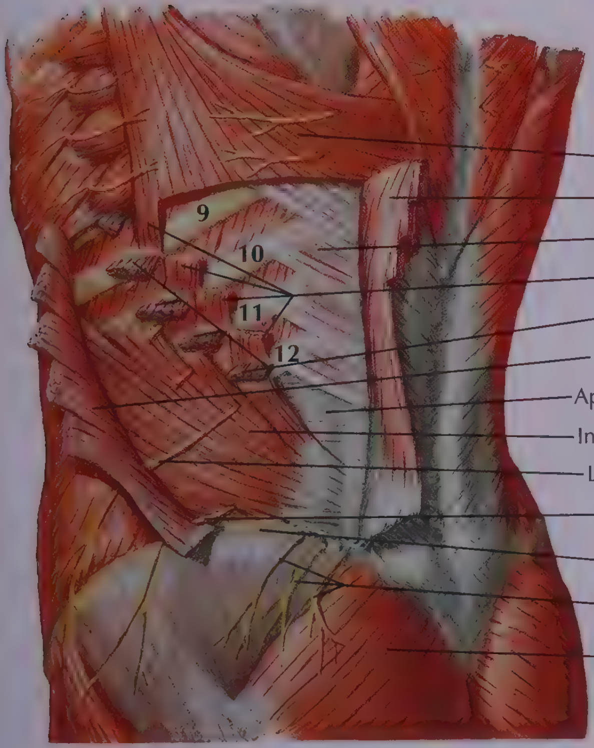
F. Netter M.D.

Anterior Abdominal Wall: Internal View

See also Plate 385


Diaphragm
Falciform ligament
Parietal peritoneum (cut edges)
Transversalis fascia (cut)
Arcuate line
Rectus abdominis m.
Inferior epigastric a. and v.
Inguinal triangle (Hesselbach's)
Transversalis fascia (cut)
Interfoveolar ligament
Deep circumflex iliac a. and v.
Deep inguinal ring
Cremasteric a.
Testicular a. and v.
Pubic branch of inferior epigastric a.
External iliac a. and v.
Spermatic cord
Femoral sheath
Lacunar ligament (Gimbernat's)
Pectineal ligament (Cooper's)
Inguinal falx
Umbilical a.
Obturator n.
Obturator a. and v.
Ureter (cut)
Anterior recess of ischioanal fossa
Superior vesical a.
Ductus deferens
Perineal membrane
Urinary bladder
External urethral sphincter
Prostate
Seminal gland
Bulbourethral gland (Cowper's; embedded in deep transverse perineal m.)
Levator ani
Obturator internus
Transverse vesical fold
Supravesical fossa
External iliac a. and v.
Iliopsoas
Right lateral umbilical fold (containing inferior epigastric a. and v.)
Femoral n.
Umbilical fascia
Paraumbilical vv (in median umbilical fold)
Median umbilical ligament
Right medial umbilical fold
Left medial umbilical ligament
Transversus abdominis m.
Internal abdominal oblique m.
External abdominal oblique m.
Transversalis fascia
Parietal peritoneum
Umbilicus
Round ligament of liver (ligamentum teres hepatis)
Paraumbilical vv
F. Netter M.D.
C. Machado M.D.

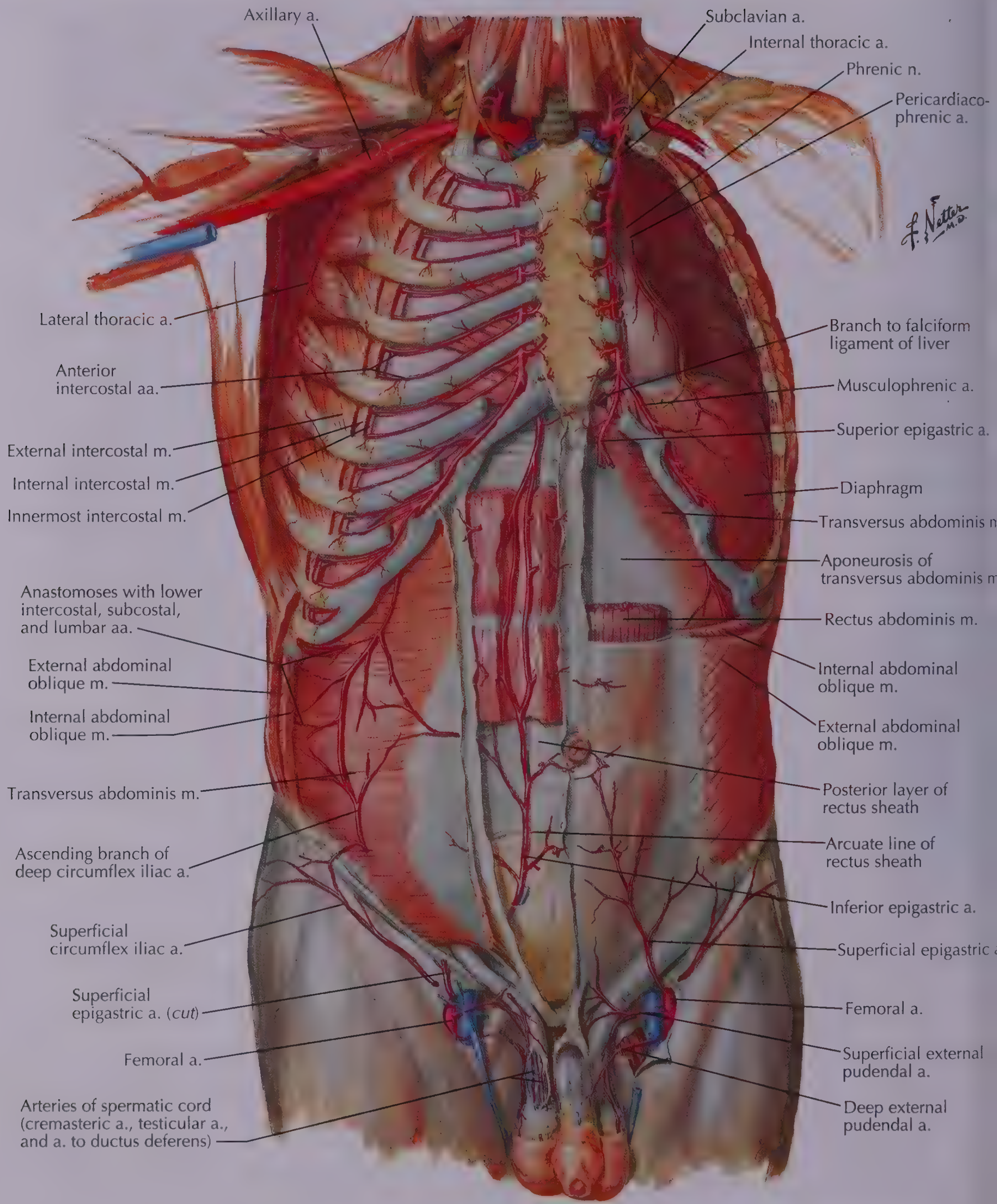

Serratus anterior m.
Infraspinatus fascia
Rhomboid major m.
Triangle of auscultation
Lateral posterior cutaneous branch of T7 spinal n.
Medial posterior cutaneous branch of T7 spinal n.
Trapezius m.
Latissimus dorsi m.
External abdominal oblique m.
Posterior layer of thoracolumbar fascia
Lateral cutaneous branch of subcostal n.
Lumbar triangle (of Petit)
Iliac crest
Lateral cutaneous branch of iliohypogastric n.
Superior gluteal cutaneous nn. (superior clunial nn.)
Gluteal aponeurosis (over gluteus medius m.)
Gluteus maximus m.


9
10
11
12
Latissimus dorsi m.
Latissimus dorsi m. (*cut and turned back*)
Serratus posterior inferior m.
Costal attachments of latissimus dorsi m.
Costal attachments of external abdominal oblique m.
External abdominal oblique m. (*cut and turned back*)
Aponeurosis of transversus abdominis m.
Internal abdominal oblique m.
Lateral cutaneous branch of subcostal n.
Lateral cutaneous branch of iliohypogastric n.
Iliac crest
Superior gluteal cutaneous nn. (superior clunial nn.)
Gluteus maximus m.

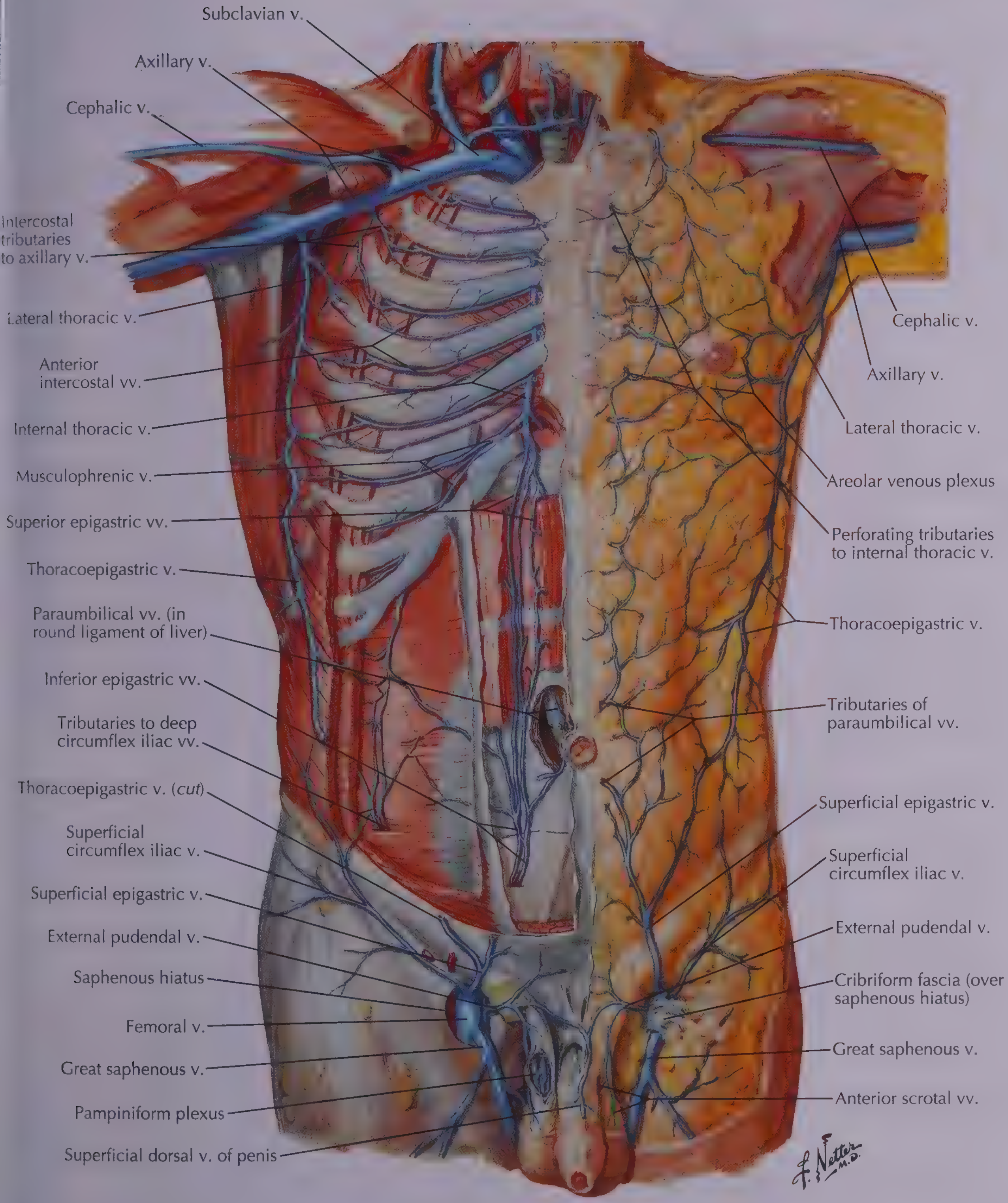
F. Netter M.D.

Arteries of Anterior Abdominal Wall

See also Plate 272

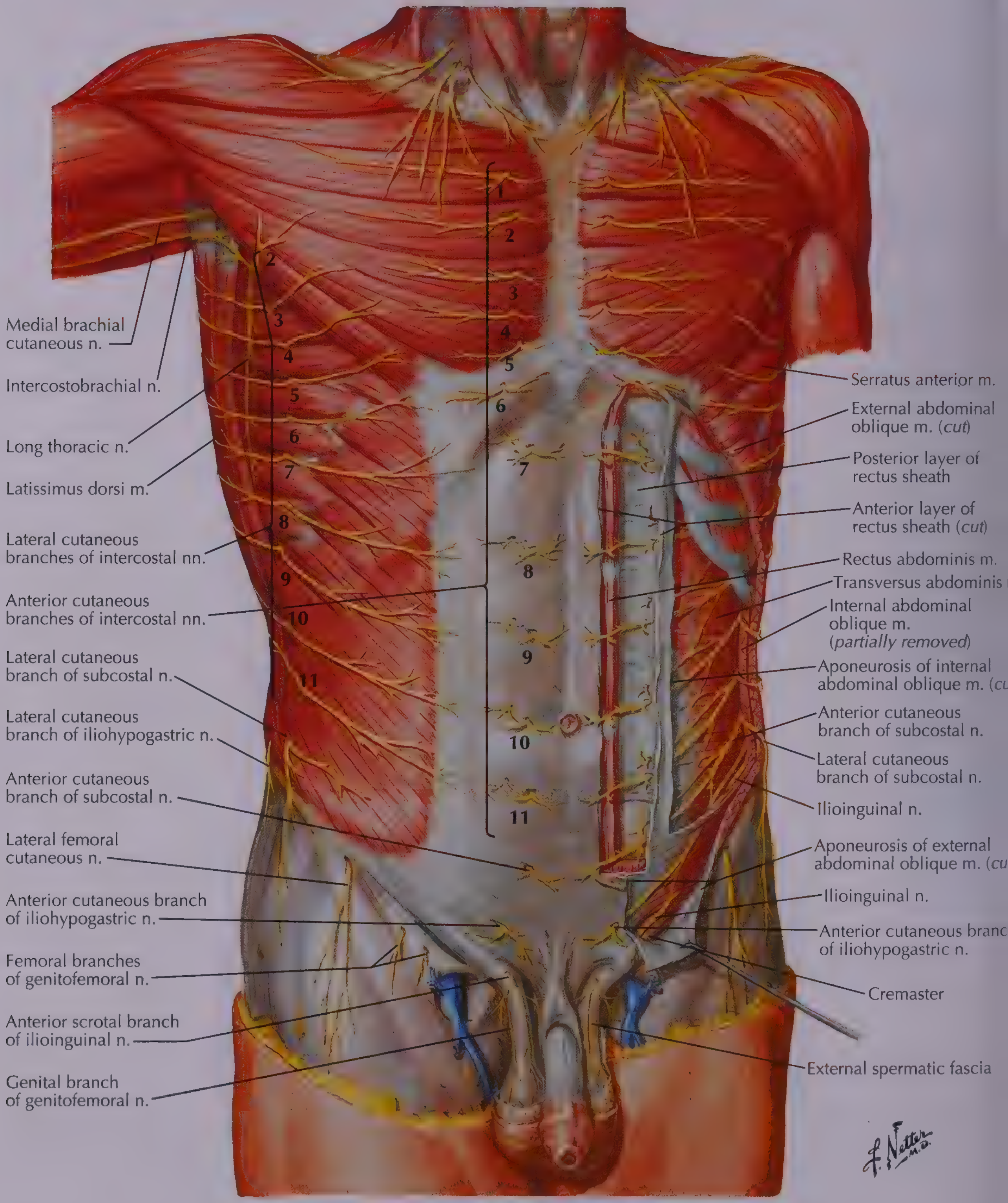

Axillary a.
Subclavian a.
Internal thoracic a.
Phrenic n.
Pericardiaco-phrenic a.
Lateral thoracic a.
Anterior intercostal aa.
External intercostal m.
Internal intercostal m.
Innermost intercostal m.
Branch to falciform ligament of liver
Musculophrenic a.
Superior epigastric a.
Diaphragm
Transversus abdominis m
Aponeurosis of transversus abdominis m
Rectus abdominis m.
Anastomoses with lower intercostal, subcostal, and lumbar aa.
External abdominal oblique m.
Internal abdominal oblique m.
Internal abdominal oblique m.
External abdominal oblique m.
Transversus abdominis m.
Posterior layer of rectus sheath
Ascending branch of deep circumflex iliac a.
Arcuate line of rectus sheath
Inferior epigastric a.
Superficial circumflex iliac a.
Superficial epigastric
Superficial epigastric a. (cut)
Femoral a.
Femoral a.
Superficial external pudendal a.
Deep external pudendal a.
Arteries of spermatic cord (cremasteric a., testicular a., and a. to ductus deferens)

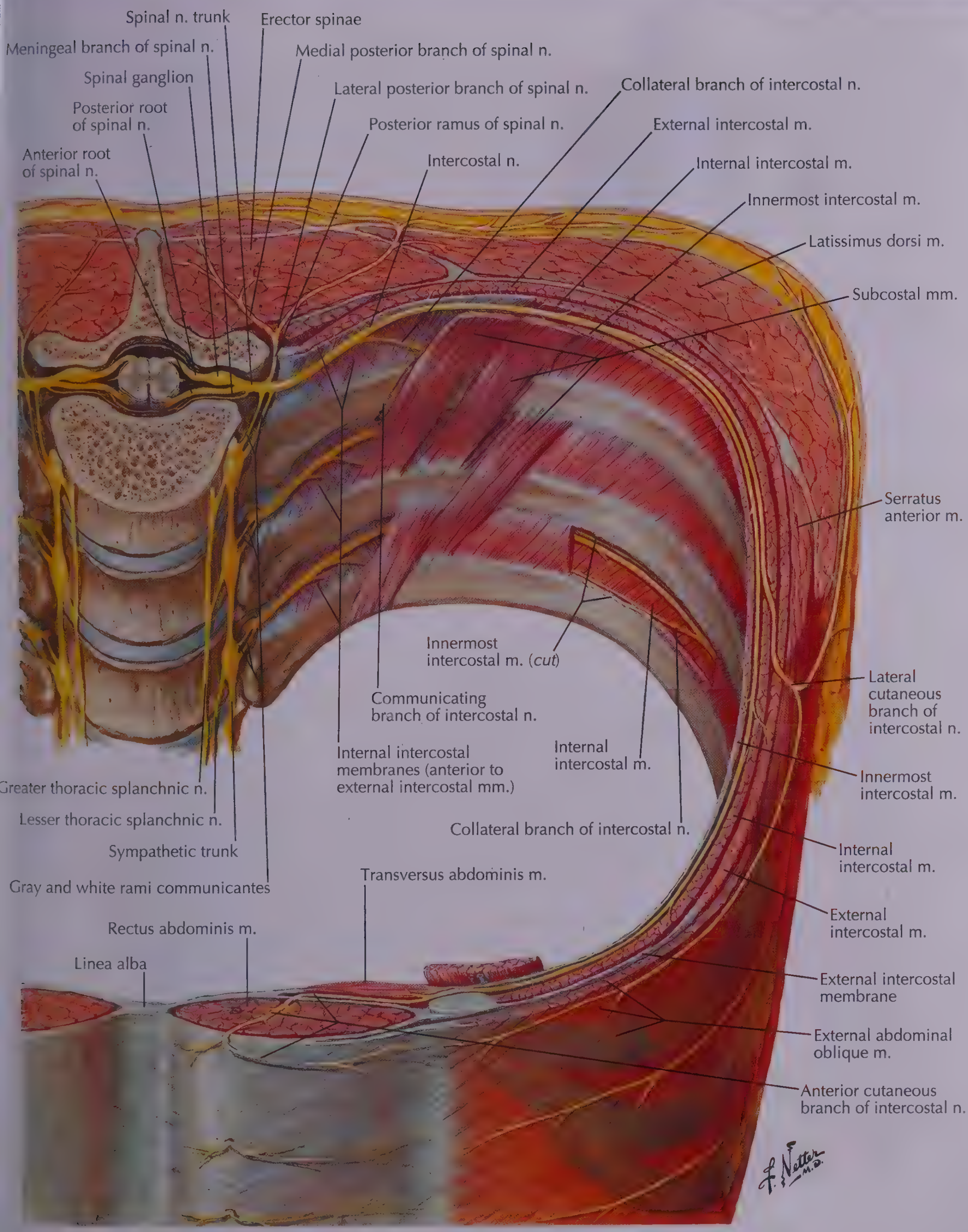
See also Plates 270, 272


Subclavian v.
Axillary v.
Cephalic v.
Intercostal tributaries to axillary v.
Lateral thoracic v.
Anterior intercostal vv.
Internal thoracic v.
Musculophrenic v.
Superior epigastric vv.
Thoracoepigastric v.
Paraumbilical vv. (in round ligament of liver)
Inferior epigastric vv.
Tributaries to deep circumflex iliac vv.
Thoracoepigastric v. (*cut*)
Superficial circumflex iliac v.
Superficial epigastric v.
External pudendal v.
Saphenous hiatus
Femoral v.
Great saphenous v.
Pampiniform plexus
Superficial dorsal v. of penis
Cephalic v.
Axillary v.
Lateral thoracic v.
Areolar venous plexus
Perforating tributaries to internal thoracic v.
Thoracoepigastric v.
Tributaries of paraumbilical vv.
Superficial epigastric v.
Superficial circumflex iliac v.
External pudendal v.
Cribriform fascia (over saphenous hiatus)
Great saphenous v.
Anterior scrotal vv.
F. Netter M.D.

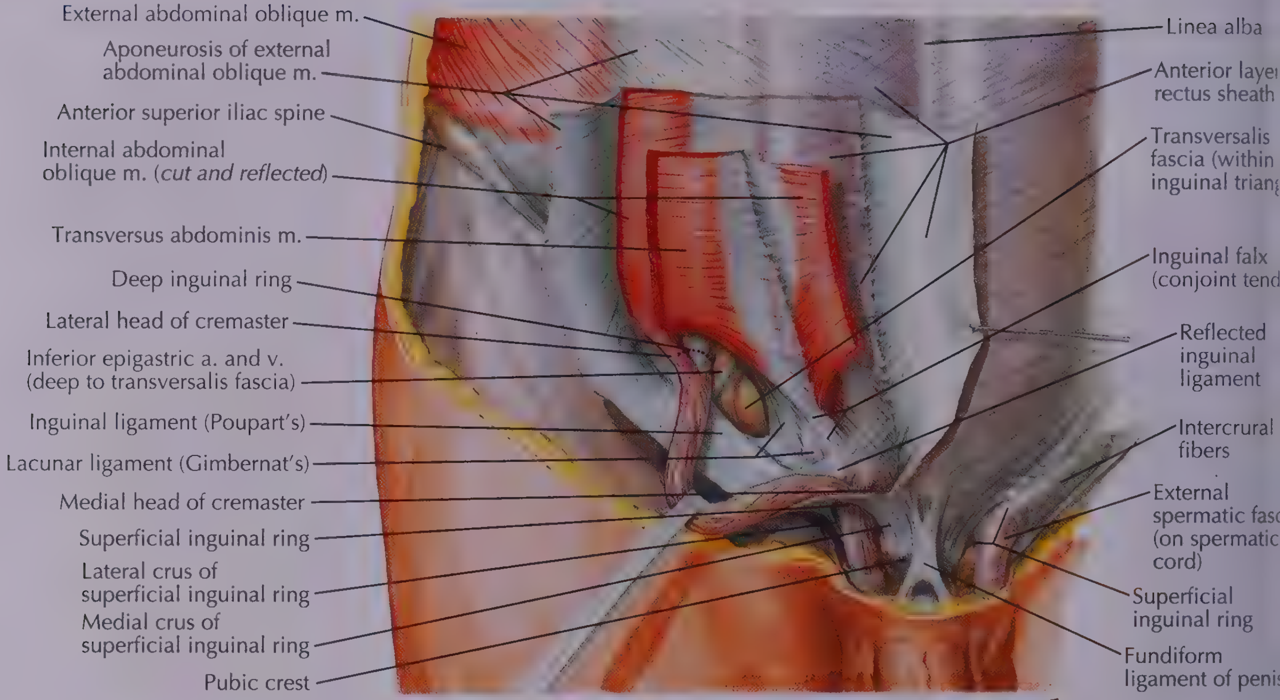
Nerves of Anterior Abdominal Wall

See also Plates 188, 201, 209, 279

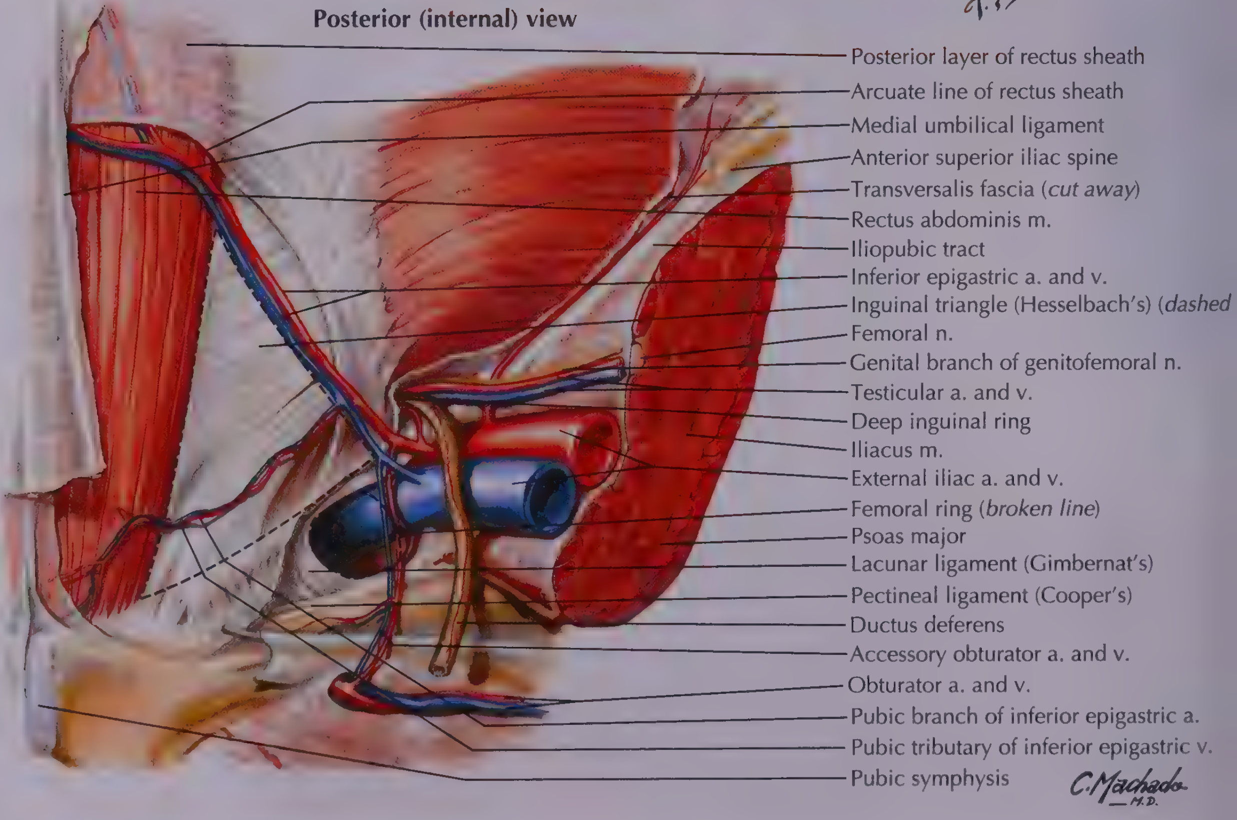

Medial brachial cutaneous n.
Intercostobrachial n.
Long thoracic n.
Latissimus dorsi m.
Lateral cutaneous branches of intercostal nn.
Anterior cutaneous branches of intercostal nn.
Lateral cutaneous branch of subcostal n.
Lateral cutaneous branch of iliohypogastric n.
Anterior cutaneous branch of subcostal n.
Lateral femoral cutaneous n.
Anterior cutaneous branch of iliohypogastric n.
Femoral branches of genitofemoral n.
Anterior scrotal branch of ilioinguinal n.
Genital branch of genitofemoral n.
2
3
4
5
6
7
8
9
10
11
1
2
3
4
5
6
7
8
9
10
11
Serratus anterior m.
External abdominal oblique m. (*cut*)
Posterior layer of rectus sheath
Anterior layer of rectus sheath (*cut*)
Rectus abdominis m.
Transversus abdominis
Internal abdominal oblique m. (*partially removed*)
Aponeurosis of internal abdominal oblique m. (*cu*
Anterior cutaneous branch of subcostal n.
Lateral cutaneous branch of subcostal n.
Ilioinguinal n.
Aponeurosis of external abdominal oblique m. (*cu*
Ilioinguinal n.
Anterior cutaneous branc of iliohypogastric n.
Cremaster
External spermatic fascia
F. Netter M.D.


Spinal n. trunk
Erector spinae
Meningeal branch of spinal n.
Medial posterior branch of spinal n.
Spinal ganglion
Lateral posterior branch of spinal n.
Collateral branch of intercostal n.
Posterior root of spinal n.
Posterior ramus of spinal n.
External intercostal m.
Anterior root of spinal n.
Intercostal n.
Internal intercostal m.
Innermost intercostal m.
Latissimus dorsi m.
Subcostal mm.
Serratus anterior m.
Innermost intercostal m. (cut)
Communicating branch of intercostal n.
Lateral cutaneous branch of intercostal n.
Internal intercostal membranes (anterior to external intercostal mm.)
Internal intercostal m.
Innermost intercostal m.
Greater thoracic splanchnic n.
Lesser thoracic splanchnic n.
Collateral branch of intercostal n.
Internal intercostal m.
Sympathetic trunk
Transversus abdominis m.
Gray and white rami communicantes
External intercostal m.
Rectus abdominis m.
Linea alba
External intercostal membrane
External abdominal oblique m.
Anterior cutaneous branch of intercostal n.
F. Netter M.D.

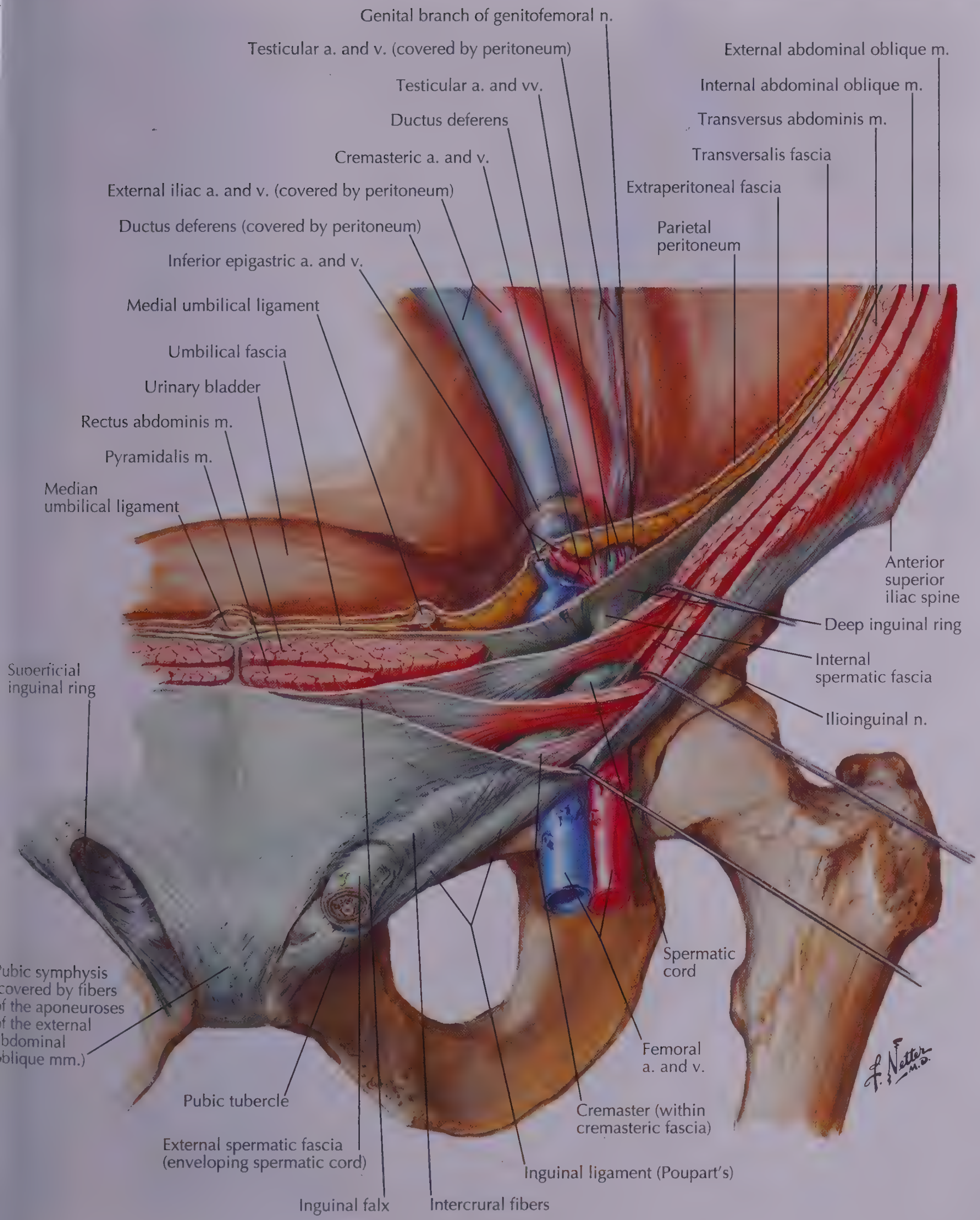
Anterior view


External abdominal oblique m.
Aponeurosis of external abdominal oblique m.
Anterior superior iliac spine
Internal abdominal oblique m. (*cut and reflected*)
Transversus abdominis m.
Deep inguinal ring
Lateral head of cremaster
Inferior epigastric a. and v. (deep to transversalis fascia)
Inguinal ligament (Poupart's)
Lacunar ligament (Gimbernat's)
Medial head of cremaster
Superficial inguinal ring
Lateral crus of superficial inguinal ring
Medial crus of superficial inguinal ring
Pubic crest
Linea alba
Anterior laye
rectus sheath
Transversalis
fascia (within
inguinal trian
Inguinal falx
(conjoint tend
Reflected inguinal ligament
Intercrural fibers
External
spermatic fas
(on spermatic
cord)
Superficial inguinal ring
Fundiform
ligament of peni

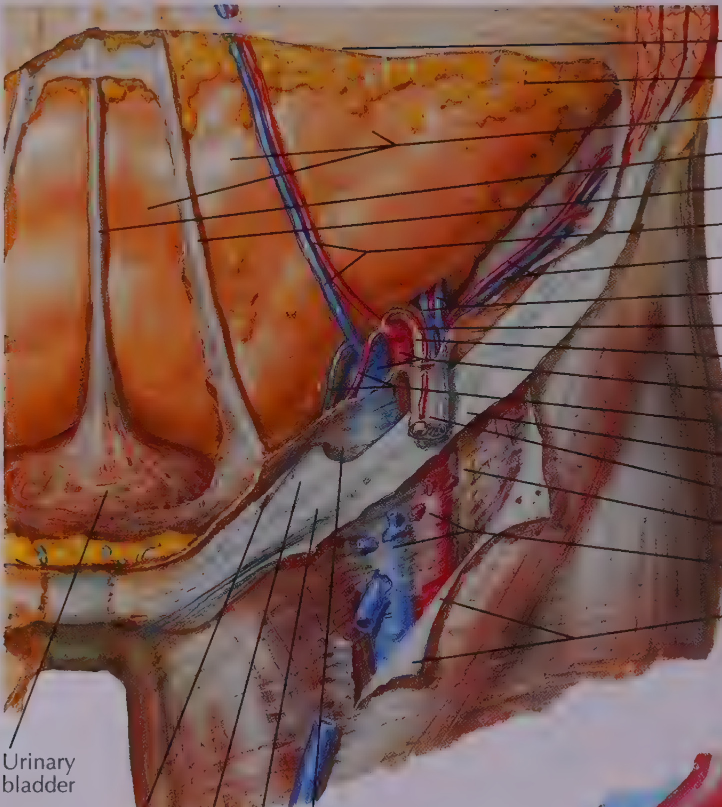
Posterior (internal) view

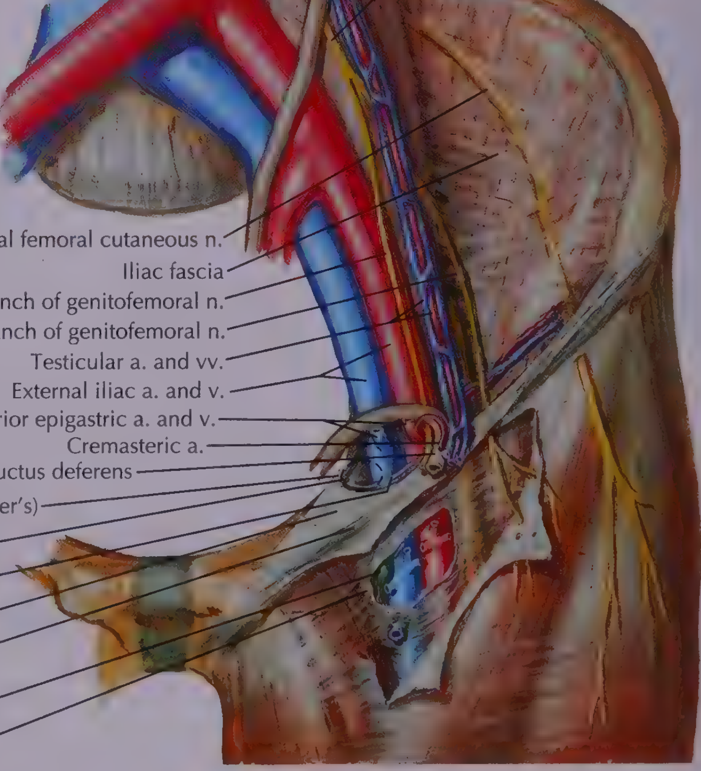

Posterior layer of rectus sheath
Arcuate line of rectus sheath
Medial umbilical ligament
Anterior superior iliac spine
Transversalis fascia (*cut away*)
Rectus abdominis m.
Iliopubic tract
Inferior epigastric a. and v.
Inguinal triangle (Hesselbach's) (*dashed*
Femoral n.
Genital branch of genitofemoral n.
Testicular a. and v.
Deep inguinal ring
Iliacus m.
External iliac a. and v.
Femoral ring (*broken line*)
Psoas major
Lacunar ligament (Gimbernat's)
Pectineal ligament (Cooper's)
Ductus deferens
Accessory obturator a. and v.
Obturator a. and v.
Pubic branch of inferior epigastric a.
Pubic tributary of inferior epigastric v.
Pubic symphysis
C. Machado M.D.

See also Plates 270, 278, BP 54


Genital branch of genitofemoral n.
Testicular a. and v. (covered by peritoneum)
Testicular a. and vv.
Ductus deferens
Cremasteric a. and v.
External iliac a. and v. (covered by peritoneum)
Ductus deferens (covered by peritoneum)
Inferior epigastric a. and v.
Medial umbilical ligament
Umbilical fascia
Urinary bladder
Rectus abdominis m.
Pyramidalis m.
Median umbilical ligament
Suoerficial inguinal ring
ubic symphysis
covered by fibers
f the aponeuroses
f the external
bdominal
blique mm.)
Pubic tubercle
External spermatic fascia (enveloping spermatic cord)
Inguinal falx
Intercrural fibers
Inguinal ligament (Poupart's)
Cremaster (within cremasteric fascia)
Femoral a. and v.
Spermatic cord
External abdominal oblique m.
Internal abdominal oblique m.
Transversus abdominis m.
Transversalis fascia
Extraperitoneal fascia
Parietal peritoneum
Anterior superior iliac spine
Deep inguinal ring
Internal spermatic fascia
Ilioinguinal n.
F. Netter M.D.

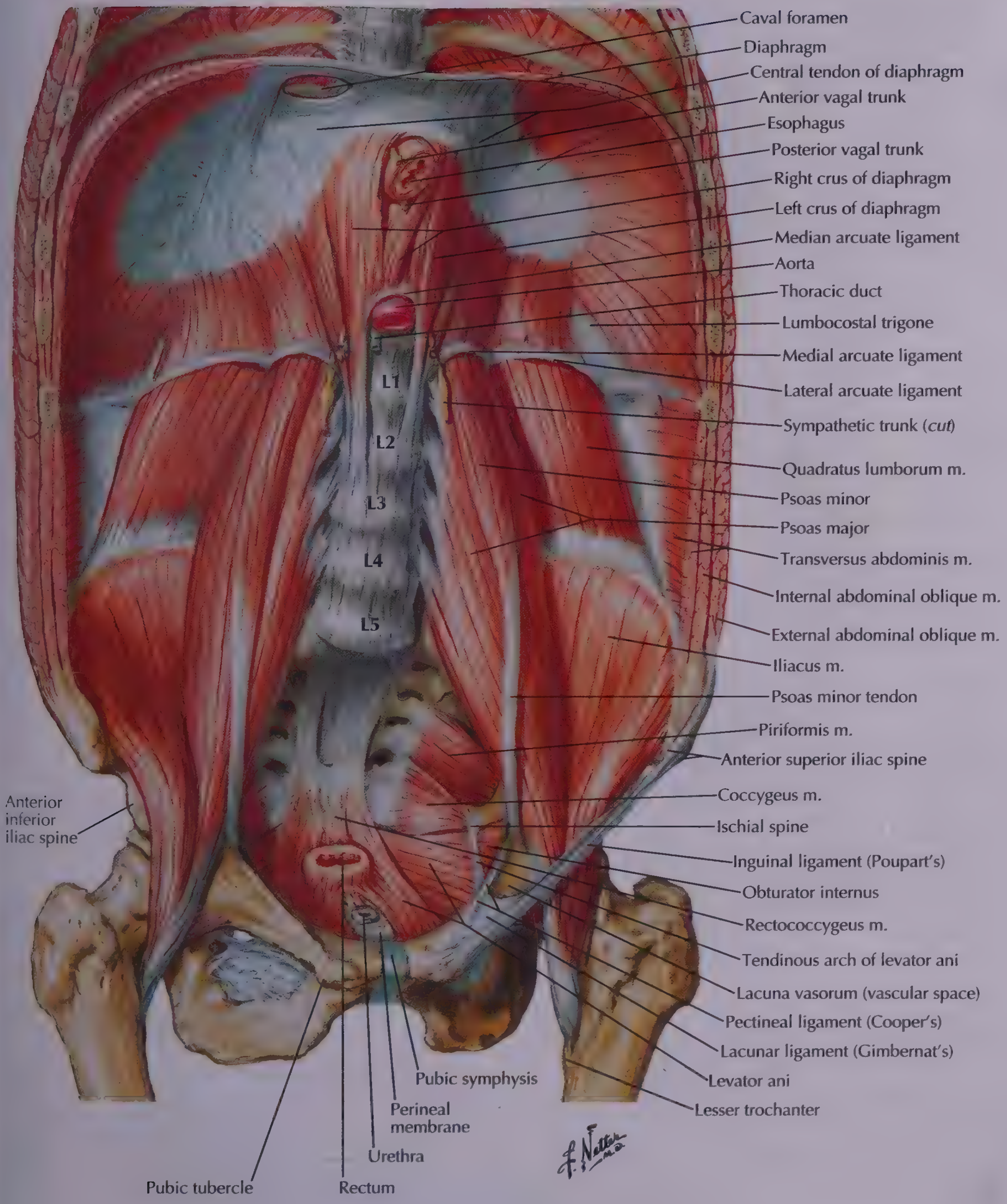
Femoral Sheath and Inguinal Canal


Transversalis fascia (*cut edge*)
Extraperitoneal fascia
Parietal peritoneum
Median umbilical ligament
Medial umbilical ligament
Inferior epigastric a. and v.
Deep circumflex iliac a. and v.
Testicular a. and v.
Cremasteric a.
Ductus deferens
External iliac a. and v.
Accessory obturator a. and v.
Aponeurosis of external abdominal oblique m. (*cut*)
Internal spermatic fascia (on spermatic cord)
Femoral n. (deep to iliopsoas fascia)
Femoral a. and v. (in femoral sheath)
Falciform margin of saphenous hiatus (*cut and reflected*)
Urinary bladder
Pectineal ligament (Cooper's)
Lacunar ligament (Gimbernat's)
Inguinal ligament (Poupart's)
Transversalis fascia (forming anterior wall of femoral sheath)


Ureter
Genitofemoral n.
Lateral femoral cutaneous n.
Iliac fascia
Genital branch of genitofemoral n.
Femoral branch of genitofemoral n.
Testicular a. and vv.
External iliac a. and v.
Inferior epigastric a. and v.
Cremasteric a.
Ductus deferens
Pectineal ligament (Cooper's)
Femoral ring
Transversalis fascia
Lacunar ligament (Gimbernat's)
Inguinal ligament (Poupart's)
Proximal deep inguinal node (Cloquet's; in femoral canal)
Femoral sheath (*cut open*)

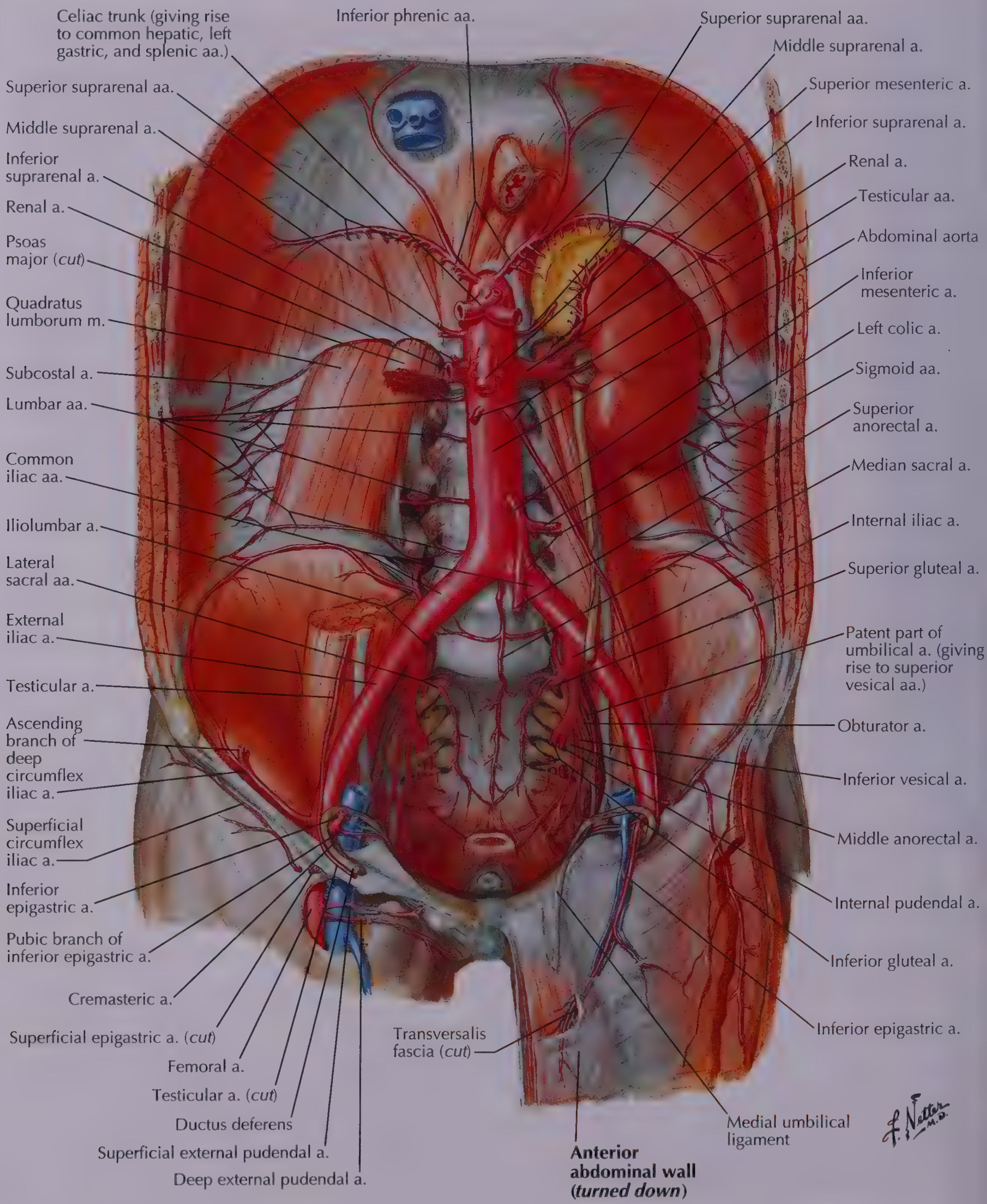
F. Netter M.D.

Posterior Abdominal Wall: Internal View

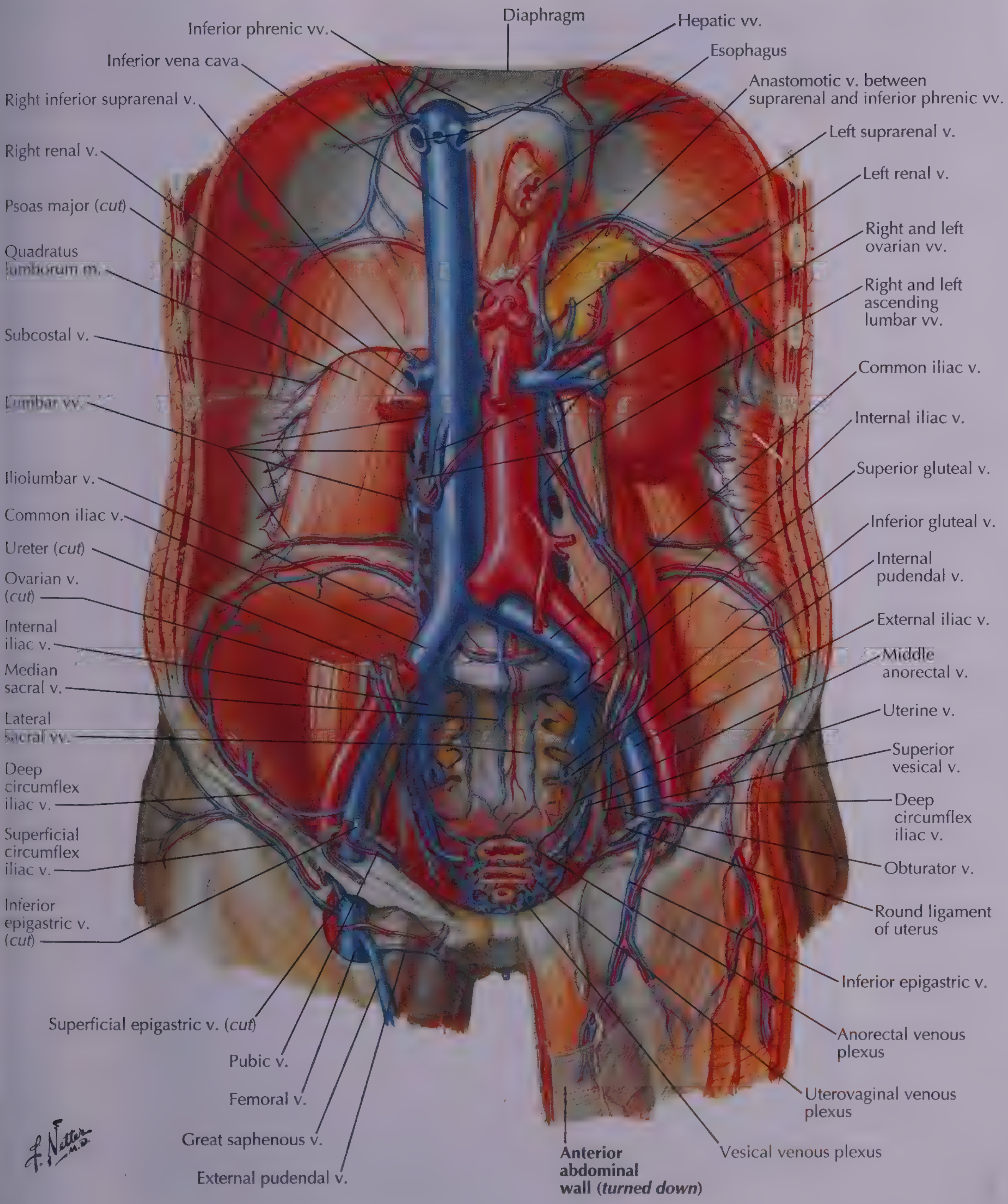

Caval foramen
Diaphragm
Central tendon of diaphragm
Anterior vagal trunk
Esophagus
Posterior vagal trunk
Right crus of diaphragm
Left crus of diaphragm
Median arcuate ligament
Aorta
Thoracic duct
Lumbocostal trigone
Medial arcuate ligament
Lateral arcuate ligament
Sympathetic trunk (*cut*)
Quadratus lumborum m.
Psoas minor
Psoas major
Transversus abdominis m.
Internal abdominal oblique m.
External abdominal oblique m.
Iliacus m.
Psoas minor tendon
Piriformis m.
Anterior superior iliac spine
Coccygeus m.
Ischial spine
Inguinal ligament (Poupart's)
Obturator internus
Rectococcygeus m.
Tendinous arch of levator ani
Lacuna vasorum (vascular space)
Pectineal ligament (Cooper's)
Lacunar ligament (Gimbernat's)
Levator ani
Lesser trochanter
L1
L2
L3
L4
L5
Anterior inferior iliac spine
Pubic symphysis
Perineal membrane
Urethra
Pubic tubercle
Rectum

Arteries of Posterior Abdominal Wall

See also Plates 216, 403, 404

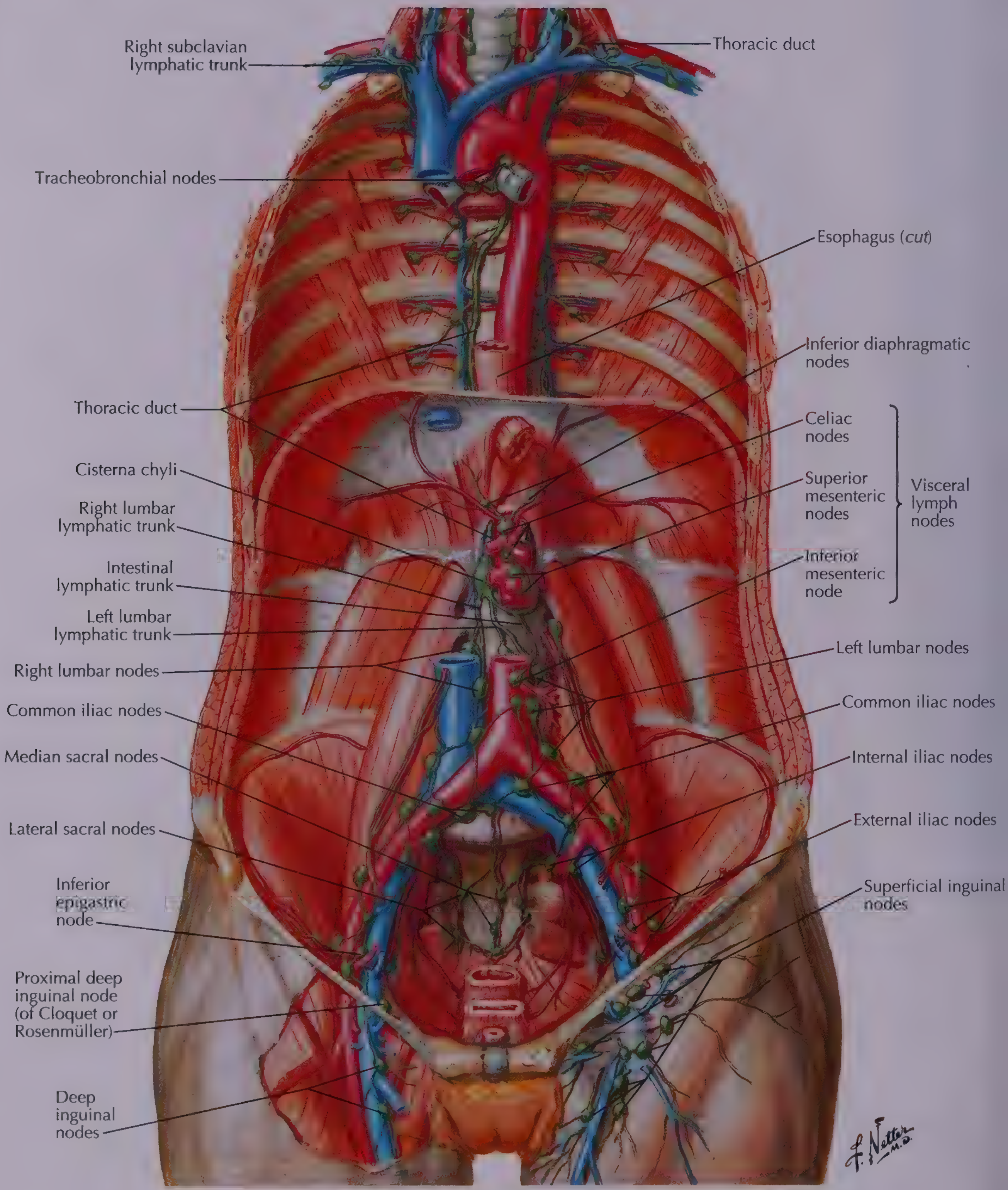

Celiac trunk (giving rise to common hepatic, left gastric, and splenic aa.)
Inferior phrenic aa.
Superior suprarenal aa.
Middle suprarenal a.
Inferior suprarenal a.
Renal a.
Psoas major (*cut*)
Quadratus lumborum m.
Subcostal a.
Lumbar aa.
Common iliac aa.
Iliolumbar a.
Lateral sacral aa.
External iliac a.
Testicular a.
Ascending branch of deep circumflex iliac a.
Superficial circumflex iliac a.
Inferior epigastric a.
Pubic branch of inferior epigastric a.
Cremasteric a.
Superficial epigastric a. (*cut*)
Femoral a.
Testicular a. (*cut*)
Ductus deferens
Superficial external pudendal a.
Deep external pudendal a.
Transversalis fascia (*cut*)
Anterior abdominal wall (*turned down*)
Medial umbilical ligament
Superior suprarenal aa.
Middle suprarenal a.
Superior mesenteric a.
Inferior suprarenal a.
Renal a.
Testicular aa.
Abdominal aorta
Inferior mesenteric a.
Left colic a.
Sigmoid aa.
Superior anorectal a.
Median sacral a.
Internal iliac a.
Superior gluteal a.
Patent part of umbilical a. (giving rise to superior vesical aa.)
Obturator a.
Inferior vesical a.
Middle anorectal a.
Internal pudendal a.
Inferior gluteal a.
Inferior epigastric a.

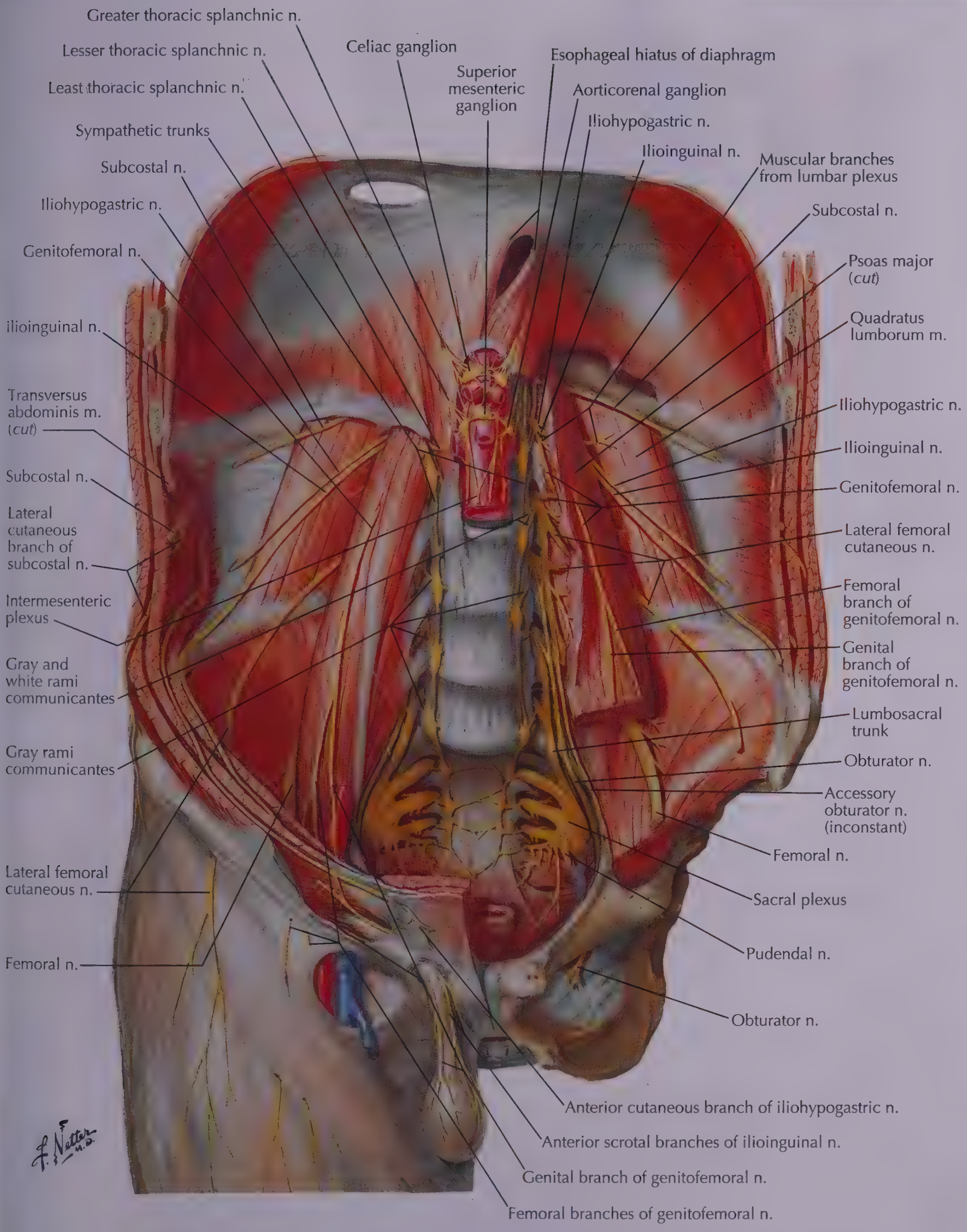
See also Plates 402, 403


Diaphragm
Inferior phrenic vv.
Hepatic vv.
Inferior vena cava
Esophagus
Right inferior suprarenal v.
Anastomotic v. between suprarenal and inferior phrenic vv.
Left suprarenal v.
Right renal v.
Left renal v.
Psoas major (*cut*)
Right and left ovarian vv.
Quadratus lumborum m.
Right and left ascending lumbar vv.
Subcostal v.
Common iliac v.
Lumbar vv.
Internal iliac v.
Iliolumbar v.
Superior gluteal v.
Common iliac v.
Inferior gluteal v.
Ureter (*cut*)
Internal pudendal v.
Ovarian v. (*cut*)
External iliac v.
Internal iliac v.
Middle anorectal v.
Median sacral v.
Uterine v.
Lateral sacral vv.
Superior vesical v.
Deep circumflex iliac v.
Deep circumflex iliac v.
Superficial circumflex iliac v.
Obturator v.
Round ligament of uterus
Inferior epigastric v. (*cut*)
Inferior epigastric v.
Superficial epigastric v. (*cut*)
Anorectal venous plexus
Pubic v.
Uterovaginal venous plexus
Femoral v.
Great saphenous v.
Vesical venous plexus
External pudendal v.
Anterior abdominal wall (*turned down*)
F. Netter M.D.

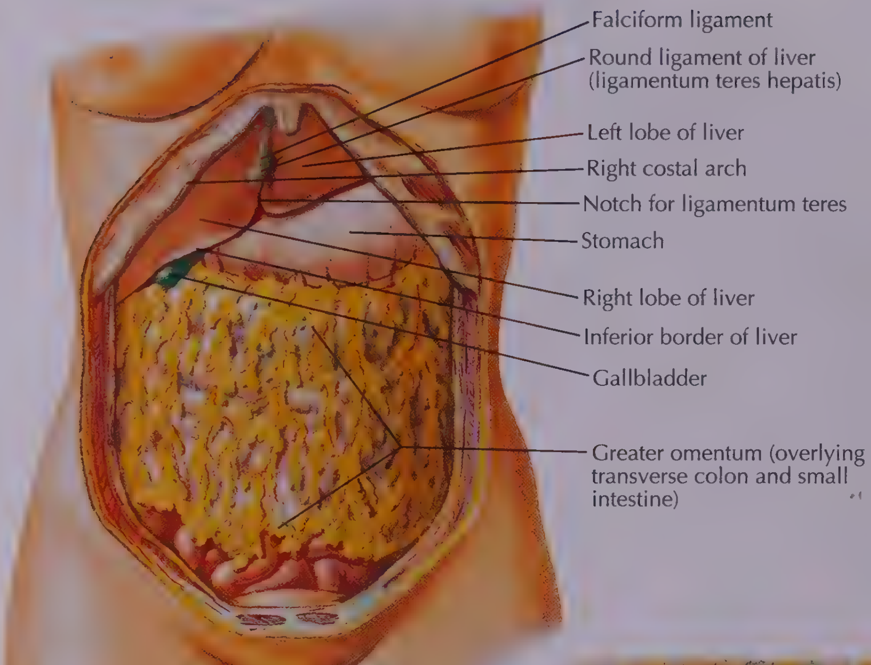
Lymph Vessels and Lymph Nodes of Posterior Abdominal Wall

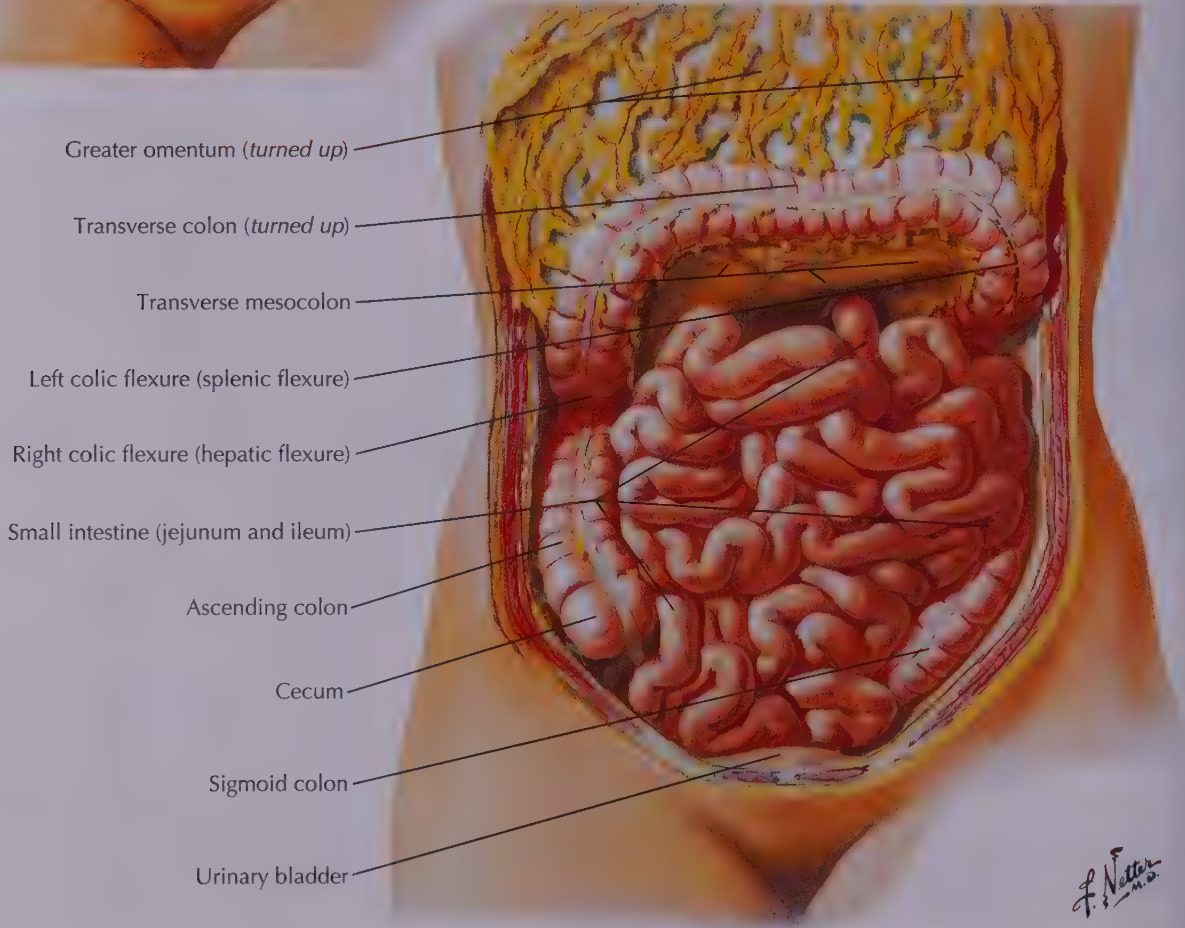
See also Plates 338, 408


Right subclavian lymphatic trunk
Thoracic duct
Tracheobronchial nodes
Esophagus (*cut*)
Inferior diaphragmatic nodes
Thoracic duct
Celiac nodes
Cisterna chyli
Superior mesenteric nodes
Visceral lymph nodes
Right lumbar lymphatic trunk
Inferior mesenteric node
Intestinal lymphatic trunk
Left lumbar lymphatic trunk
Left lumbar nodes
Right lumbar nodes
Common iliac nodes
Common iliac nodes
Median sacral nodes
Internal iliac nodes
Lateral sacral nodes
External iliac nodes
Inferior epigastric node
Superficial inguinal nodes
Proximal deep inguinal node (of Cloquet or Rosenmüller)
Deep inguinal nodes
F. Netter M.D.


Greater thoracic splanchnic n.
Lesser thoracic splanchnic n.
Least thoracic splanchnic n.
Sympathetic trunks
Subcostal n.
Iliohypogastric n.
Genitofemoral n.
ilioinguinal n.
Transversus abdominis m. (*cut*)
Subcostal n.
Lateral cutaneous branch of subcostal n.
Intermesenteric plexus
Gray and white rami communicantes
Gray rami communicantes
Lateral femoral cutaneous n.
Femoral n.
Celiac ganglion
Superior mesenteric ganglion
Esophageal hiatus of diaphragm
Aorticorenal ganglion
Iliohypogastric n.
Ilioinguinal n.
Muscular branches from lumbar plexus
Subcostal n.
Psoas major (*cut*)
Quadratus lumborum m.
Iliohypogastric n.
Ilioinguinal n.
Genitofemoral n.
Lateral femoral cutaneous n.
Femoral branch of genitofemoral n.
Genital branch of genitofemoral n.
Lumbosacral trunk
Obturator n.
Accessory obturator n. (inconstant)
Femoral n.
Sacral plexus
Pudendal n.
Obturator n.
Anterior cutaneous branch of iliohypogastric n.
Anterior scrotal branches of ilioinguinal n.
Genital branch of genitofemoral n.
Femoral branches of genitofemoral n.
F. Netter M.D.

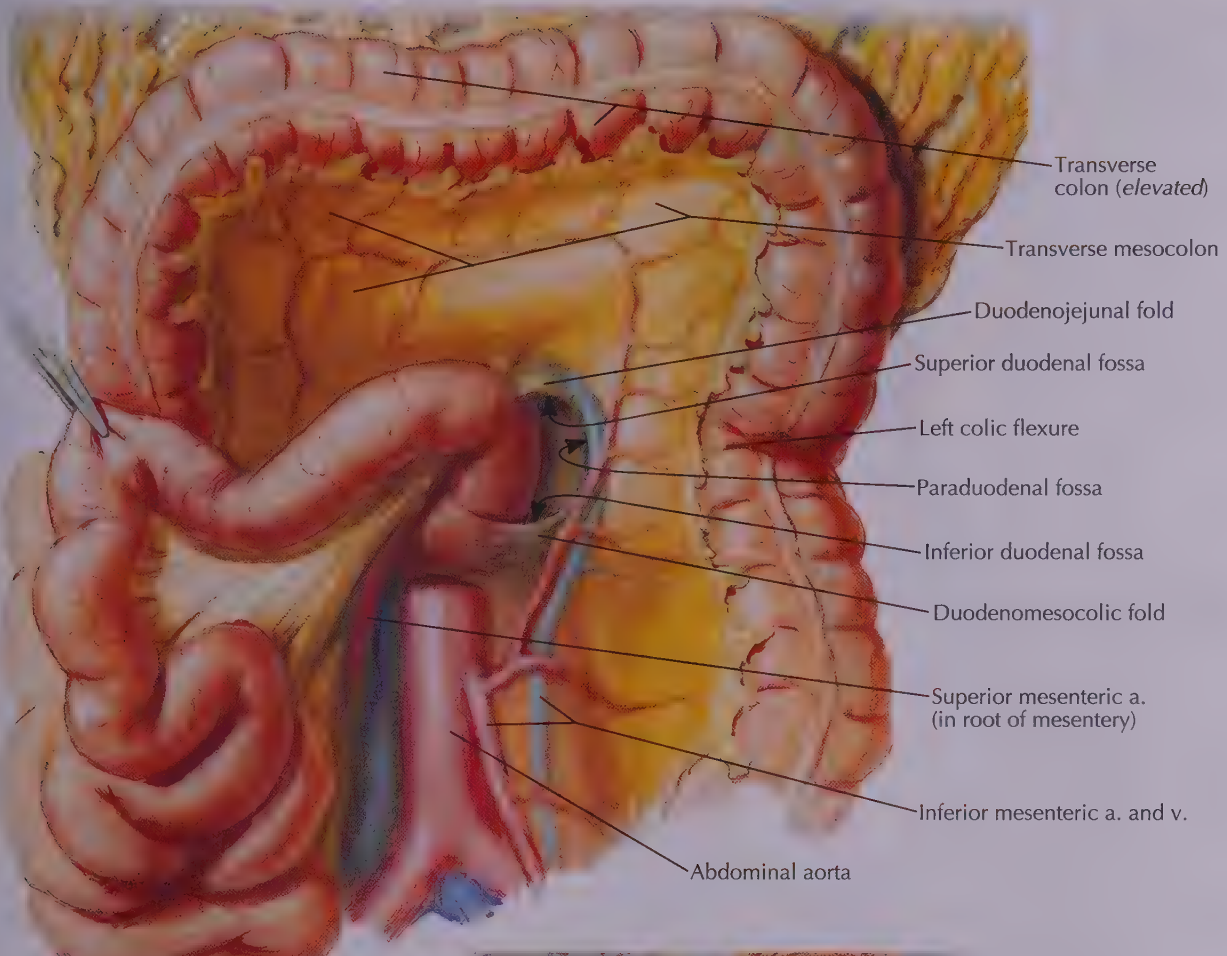
Greater Omentum and Abdominal Viscera

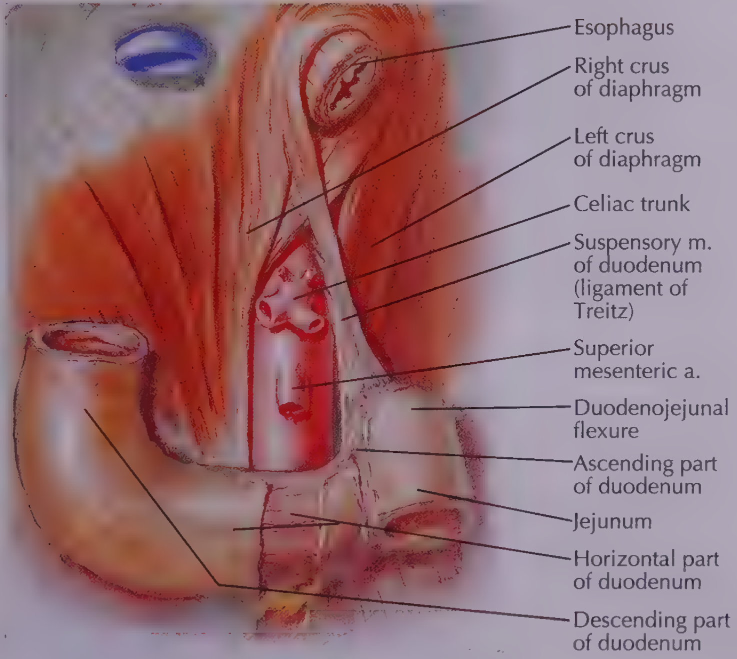

Falciform ligament
Round ligament of liver (ligamentum teres hepatis)
Left lobe of liver
Right costal arch
Notch for ligamentum teres
Stomach
Right lobe of liver
Inferior border of liver
Gallbladder
Greater omentum (overlying transverse colon and small intestine)


Greater omentum (*turned up*)
Transverse colon (*turned up*)
Transverse mesocolon
Left colic flexure (splenic flexure)
Right colic flexure (hepatic flexure)
Small intestine (jejunum and ileum)
Ascending colon
Cecum
Sigmoid colon
Urinary bladder

Mesenteries and Suspensory Muscle of Duodenum

See also Plate 306


Transverse colon (*elevated*)
Transverse mesocolon
Duodenojejunal fold
Superior duodenal fossa
Left colic flexure
Paraduodenal fossa
Inferior duodenal fossa
Duodenomesocolic fold
Superior mesenteric a. (in root of mesentery)
Inferior mesenteric a. and v.
Abdominal aorta


Esophagus
Right crus of diaphragm
Left crus of diaphragm
Celiac trunk
Suspensory m. of duodenum (ligament of Treitz)
Superior mesenteric a.
Duodenojejunal flexure
Ascending part of duodenum
Jejunum
Horizontal part of duodenum
Descending part of duodenum

Exposure of suspensory muscle of duodenum

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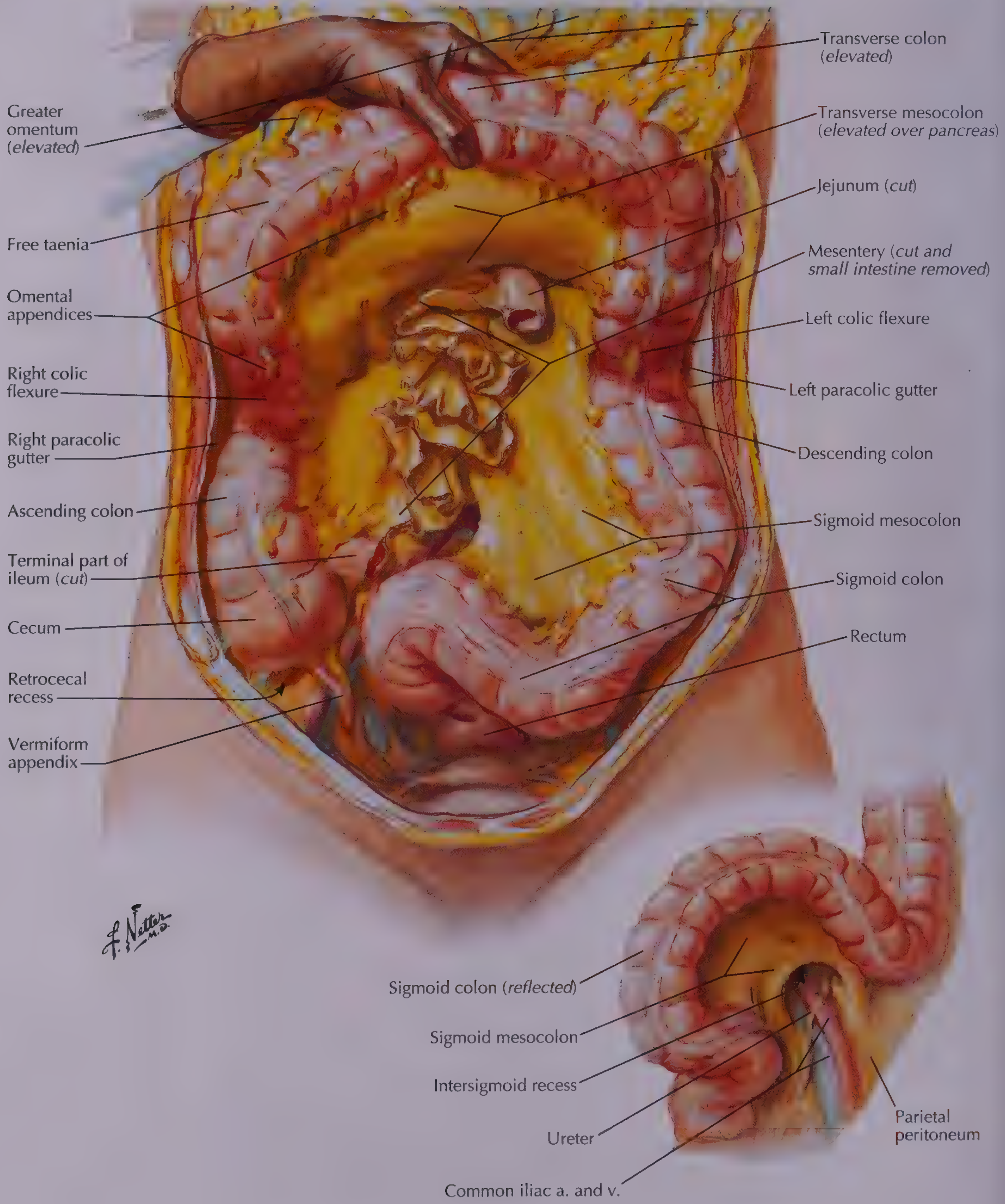
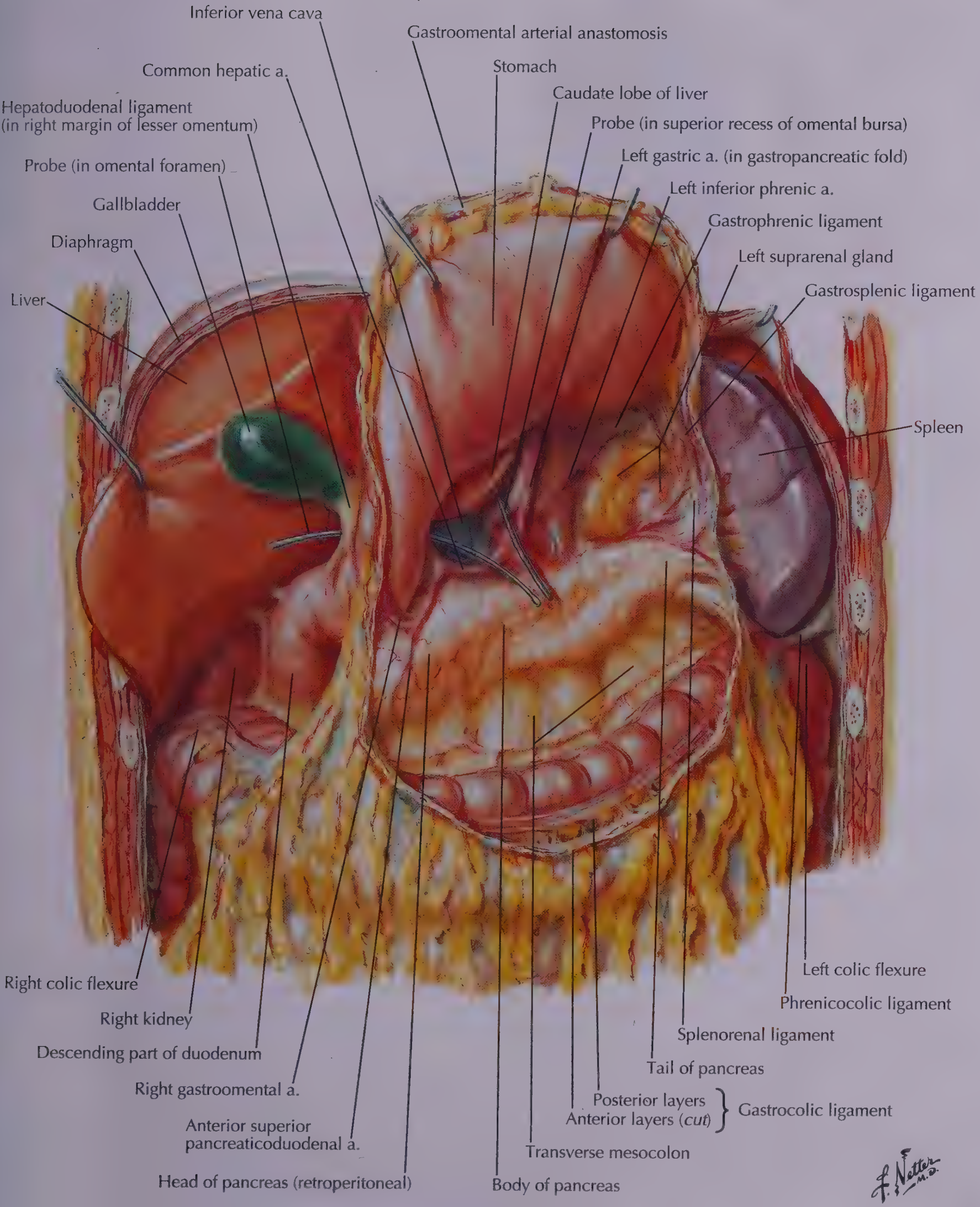
Mesocolons and Root of Mesentery

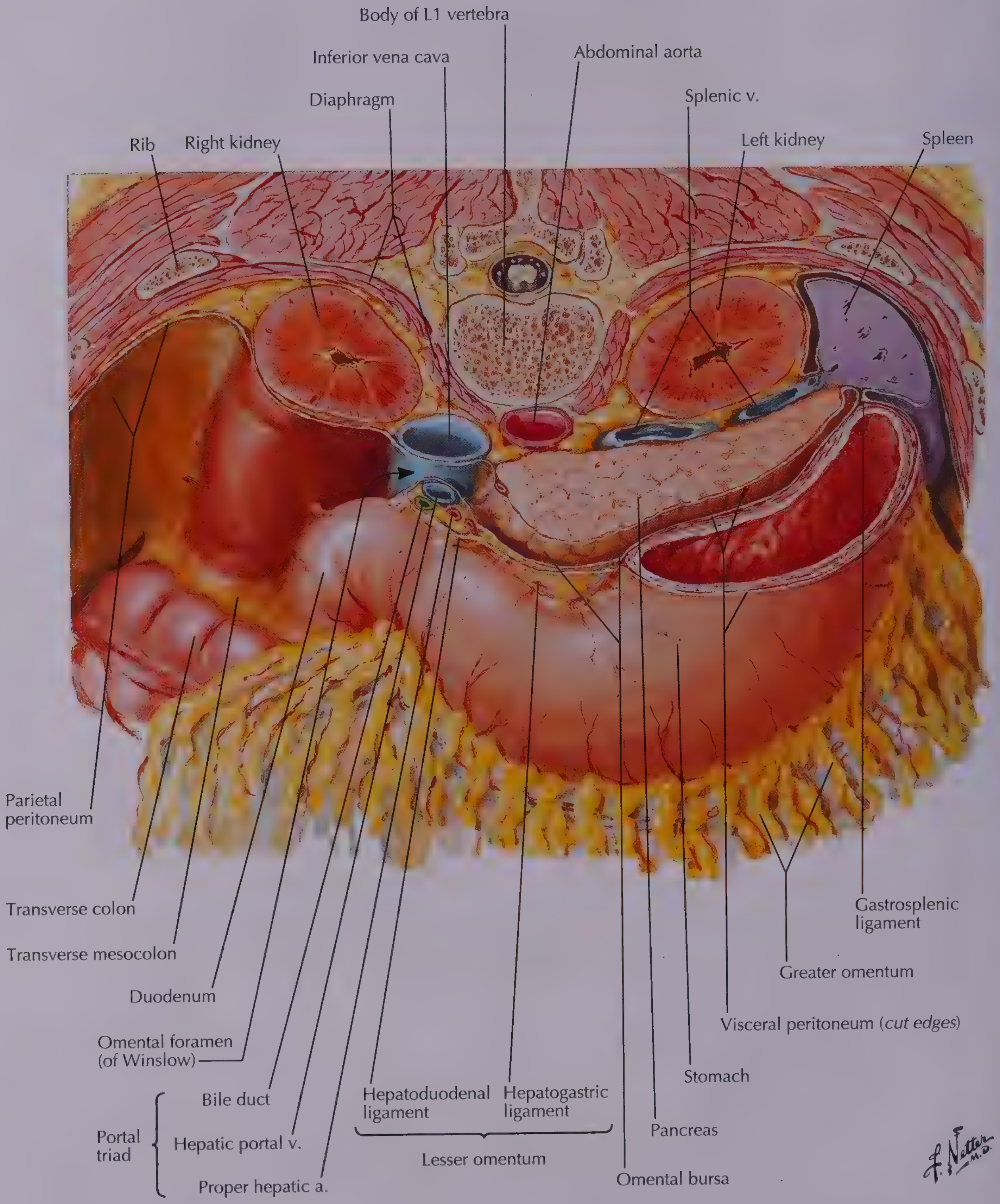
See also Plates 314, BP 60


Transverse colon (*elevated*)
Greater omentum (*elevated*)
Transverse mesocolon (*elevated over pancreas*)
Jejunum (*cut*)
Free taenia
Mesentery (*cut and small intestine removed*)
Omental appendices
Left colic flexure
Right colic flexure
Left paracolic gutter
Right paracolic gutter
Descending colon
Ascending colon
Sigmoid mesocolon
Terminal part of ileum (*cut*)
Sigmoid colon
Cecum
Rectum
Retrocecal recess
Vermiform appendix
Sigmoid colon (*reflected*)
Sigmoid mesocolon
Intersigmoid recess
Ureter
Parietal peritoneum
Common iliac a. and v.


Inferior vena cava
Gastroomental arterial anastomosis
Common hepatic a.
Stomach
Caudate lobe of liver
Hepatoduodenal ligament (in right margin of lesser omentum)
Probe (in superior recess of omental bursa)
Probe (in omental foramen)
Left gastric a. (in gastropancreatic fold)
Gallbladder
Left inferior phrenic a.
Diaphragm
Gastrophrenic ligament
Left suprarenal gland
Gastrosplenic ligament
Liver
Spleen
Left colic flexure
Right colic flexure
Phrenicocolic ligament
Right kidney
Splenorenal ligament
Descending part of duodenum
Tail of pancreas
Right gastroomental a.
Posterior layers
Anterior layers (*cut*)
Gastrocolic ligament
Anterior superior pancreaticoduodenal a.
Transverse mesocolon
Head of pancreas (retroperitoneal)
Body of pancreas
F. Netter M.D.

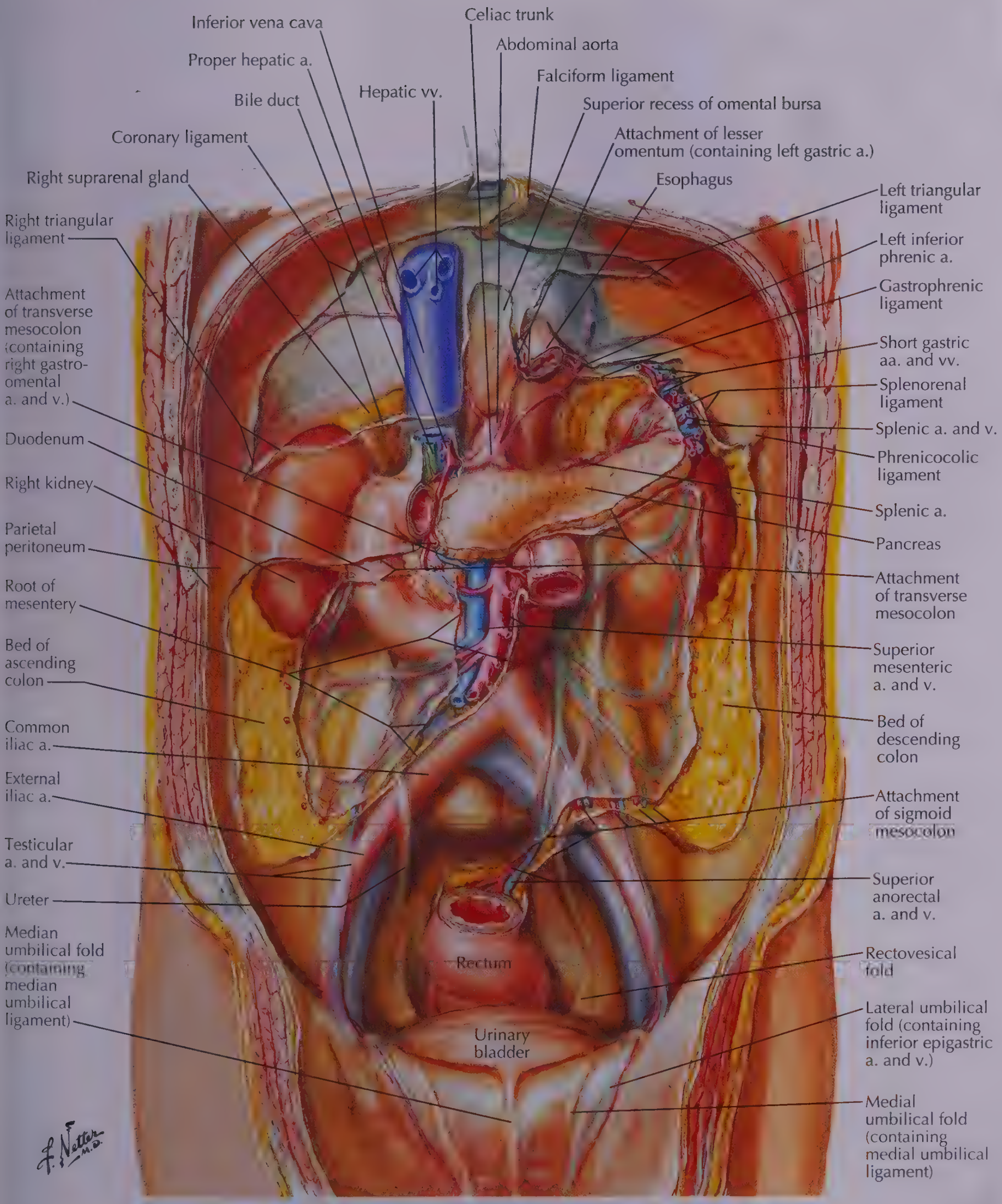
Omental Bursa: Cross Section

See also Plate 294


Body of L1 vertebra
Inferior vena cava
Abdominal aorta
Diaphragm
Splenic v.
Rib
Right kidney
Left kidney
Spleen
Parietal peritoneum
Transverse colon
Transverse mesocolon
Duodenum
Omental foramen (of Winslow)
Portal triad
Bile duct
Hepatic portal v.
Proper hepatic a.
Hepatoduodenal ligament
Hepatogastric ligament
Lesser omentum
Omental bursa
Pancreas
Stomach
Visceral peritoneum (*cut edges*)
Greater omentum
Gastrosplenic ligament
F. Netter M.D.

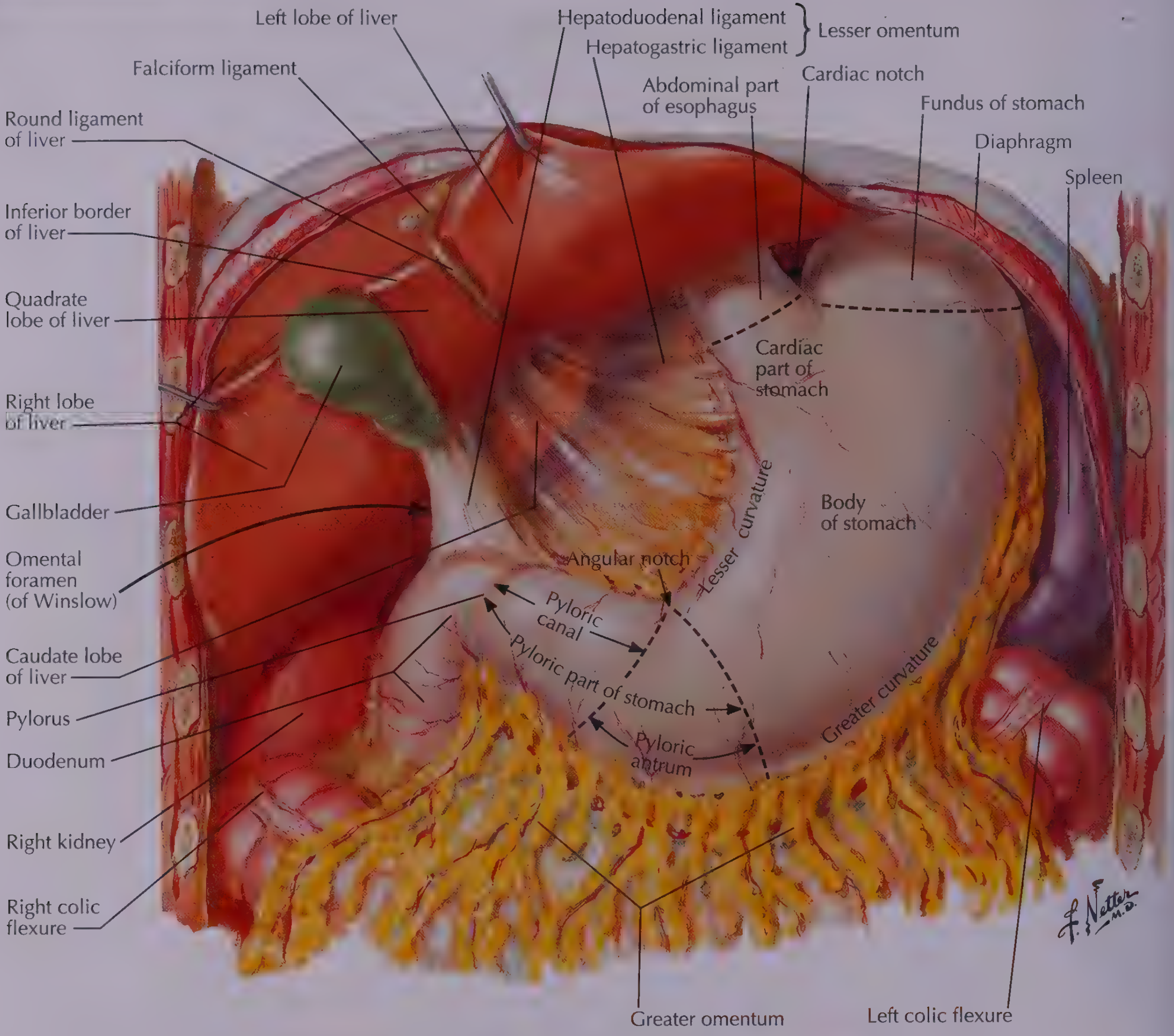
Peritoneum of Posterior Abdominal Wall

See also Plate 296

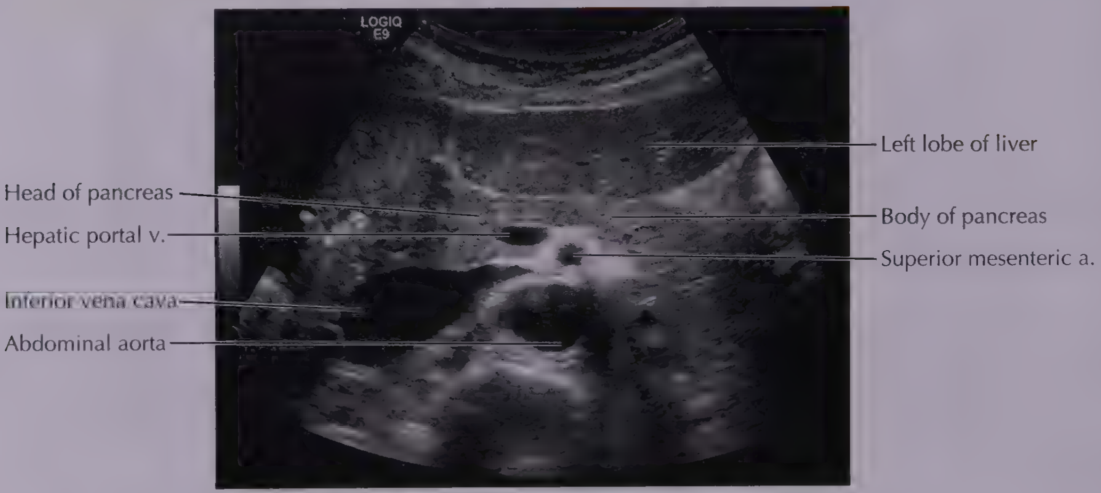

Inferior vena cava
Celiac trunk
Abdominal aorta
Proper hepatic a.
Falciform ligament
Hepatic vv.
Bile duct
Superior recess of omental bursa
Attachment of lesser omentum (containing left gastric a.)
Coronary ligament
Esophagus
Right suprarenal gland
Right triangular ligament
Attachment of transverse mesocolon (containing right gastro-omental a. and v.)
Duodenum
Right kidney
Parietal peritoneum
Root of mesentery
Bed of ascending colon
Common iliac a.
External iliac a.
Testicular a. and v.
Ureter
Median umbilical fold (containing median umbilical ligament)
Left triangular ligament
Left inferior phrenic a.
Gastrophrenic ligament
Short gastric aa. and vv.
Splenorenal ligament
Splenic a. and v.
Phrenicocolic ligament
Splenic a.
Pancreas
Attachment of transverse mesocolon
Superior mesenteric a. and v.
Bed of descending colon
Attachment of sigmoid mesocolon
Superior anorectal a. and v.
Rectovesical fold
Lateral umbilical fold (containing inferior epigastric a. and v.)
Medial umbilical fold (containing medial umbilical ligament)
Rectum
Urinary bladder

Stomach in Situ

See also Plate BP 55

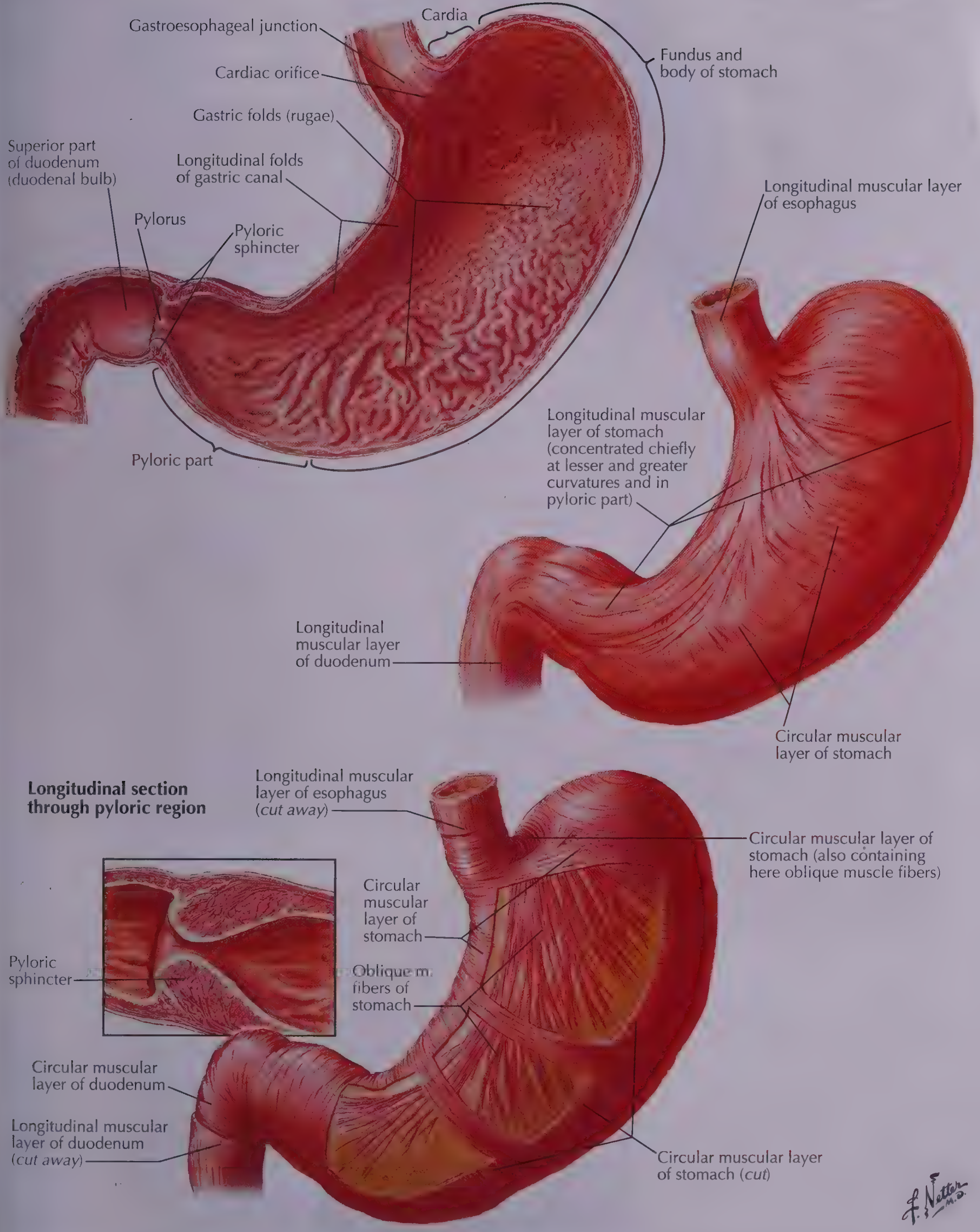

Left lobe of liver
Hepatoduodenal ligament
Hepatogastric ligament
Lesser omentum
Falciform ligament
Cardiac notch
Abdominal part of esophagus
Fundus of stomach
Round ligament of liver
Diaphragm
Spleen
Inferior border of liver
Quadrate lobe of liver
Cardiac part of stomach
Right lobe of liver
Gallbladder
Lesser curvature
Body of stomach
Omental foramen (of Winslow)
Angular notch
Pyloric canal
Caudate lobe of liver
Pyloric part of stomach
Pylorus
Greater curvature
Pyloric antrum
Duodenum
Right kidney
Right colic flexure
F. Netter M.D.
Greater omentum
Left colic flexure

Transverse gray-scale ultrasound image of midabdomen


LOGIQ E9
Left lobe of liver
Head of pancreas
Body of pancreas
Hepatic portal v.
Superior mesenteric a.
Inferior vena cava
Abdominal aorta

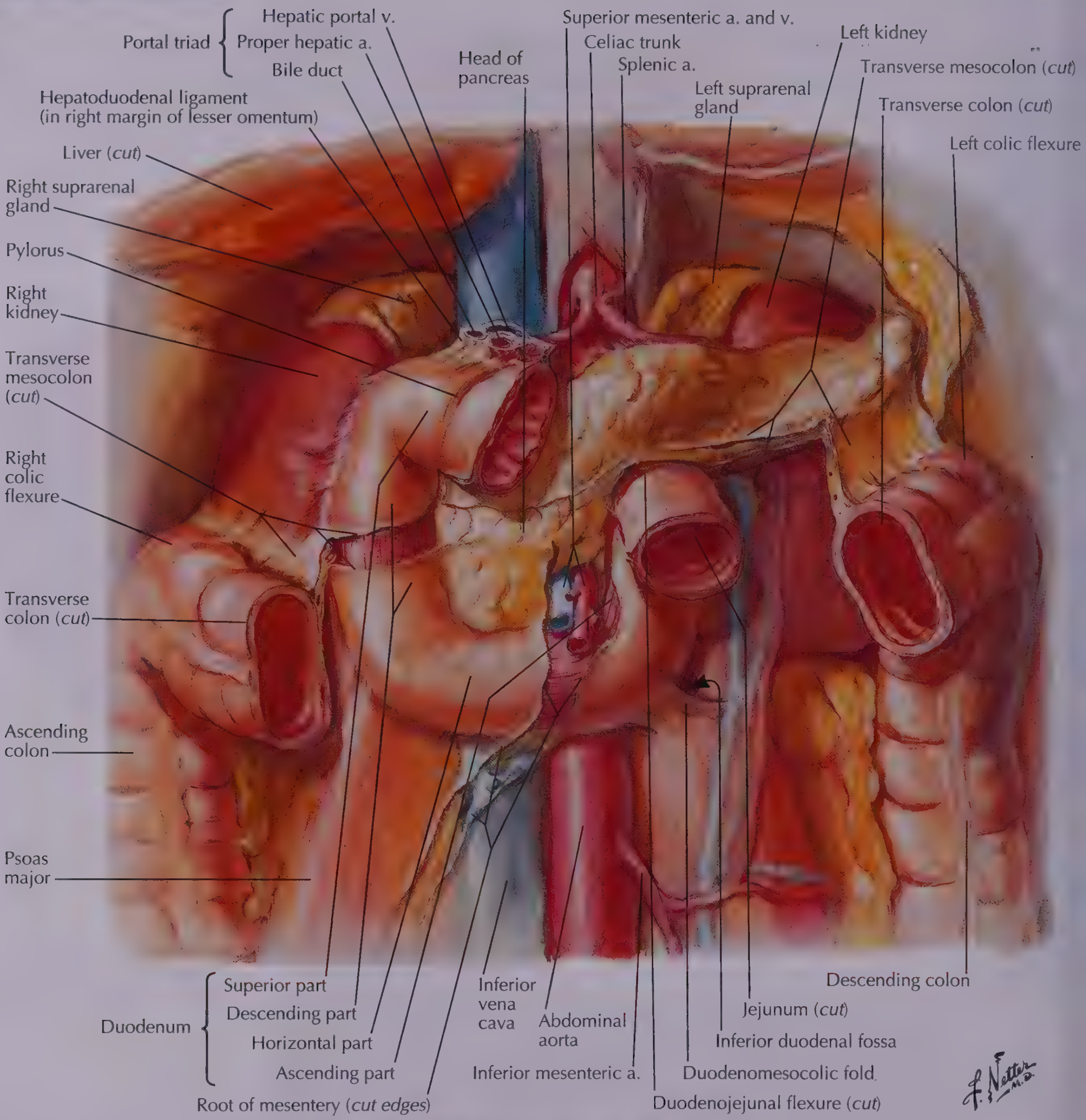
Mucosa of Stomach

See also Plate BP 55

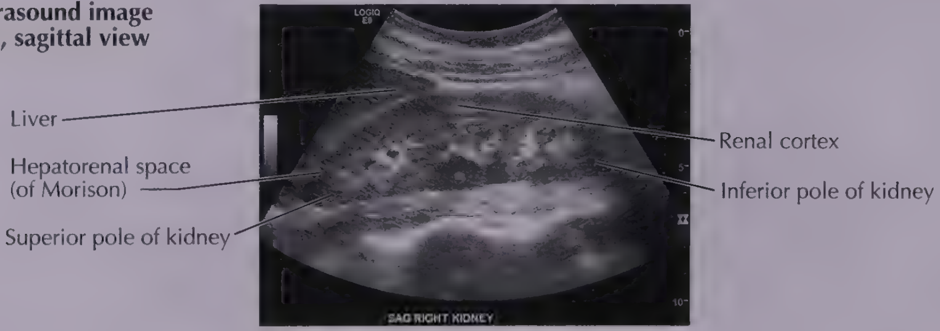

Gastroesophageal junction
Cardia
Cardiac orifice
Fundus and body of stomach
Gastric folds (rugae)
Superior part of duodenum (duodenal bulb)
Longitudinal folds of gastric canal
Pylorus
Pyloric sphincter
Longitudinal muscular layer of esophagus
Pyloric part
Longitudinal muscular layer of stomach (concentrated chiefly at lesser and greater curvatures and in pyloric part)
Longitudinal muscular layer of duodenum
Circular muscular layer of stomach
Longitudinal section through pyloric region
Longitudinal muscular layer of esophagus (cut away)
Circular muscular layer of stomach (also containing here oblique muscle fibers)
Circular muscular layer of stomach
Pyloric sphincter
Oblique m. fibers of stomach
Circular muscular layer of duodenum
Longitudinal muscular layer of duodenum (cut away)
Circular muscular layer of stomach (cut)
F. Netter M.D.

Duodenum in Situ

See also Plate 293

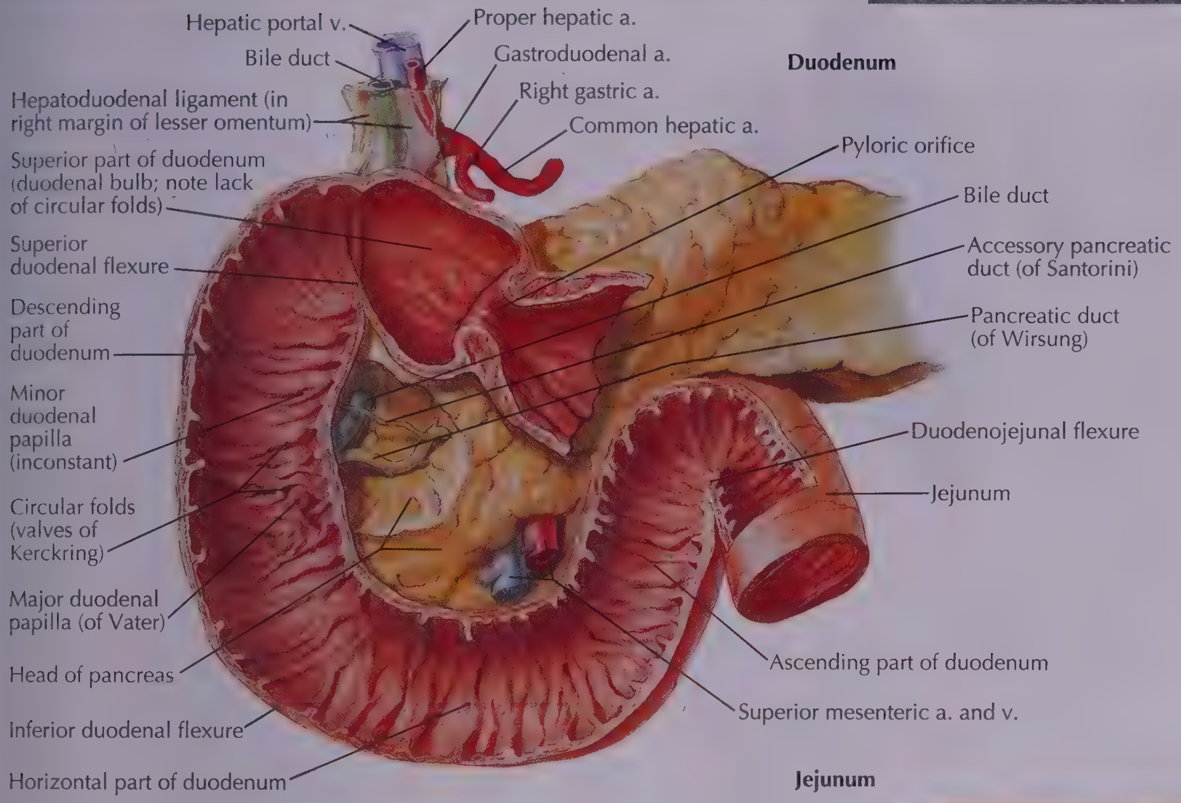

Portal triad
Hepatic portal v.
Proper hepatic a.
Bile duct
Hepatoduodenal ligament (in right margin of lesser omentum)
Head of pancreas
Superior mesenteric a. and v.
Celiac trunk
Splenic a.
Left suprarenal gland
Left kidney
Transverse mesocolon (*cut*)
Transverse colon (*cut*)
Left colic flexure
Liver (*cut*)
Right suprarenal gland
Pylorus
Right kidney
Transverse mesocolon (*cut*)
Right colic flexure
Transverse colon (*cut*)
Ascending colon
Psoas major
Duodenum
Superior part
Descending part
Horizontal part
Ascending part
Root of mesentery (*cut edges*)
Inferior vena cava
Abdominal aorta
Inferior mesenteric a.
Descending colon
Jejunum (*cut*)
Inferior duodenal fossa
Duodenomesocolic fold
Duodenojejunal flexure (*cut*)
F. Netter M.D.

Gray-scale ultrasound image of right kidney, sagittal view

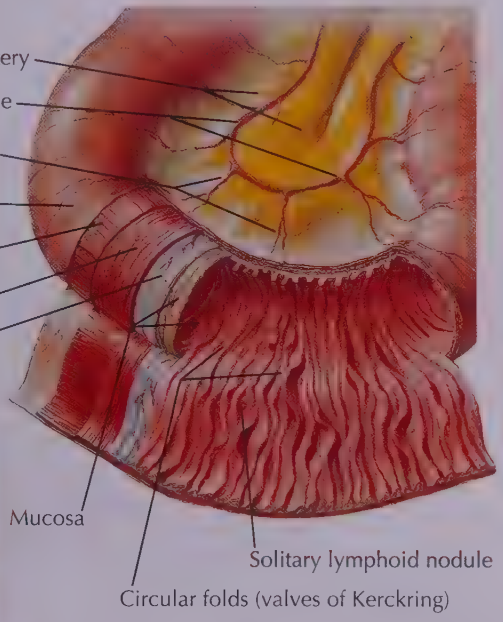

Liver
Hepatorenal space (of Morison)
Superior pole of kidney
Renal cortex
Inferior pole of kidney
SAG RIGHT KIDNEY

See also Plates 295, BP 56, BP 62

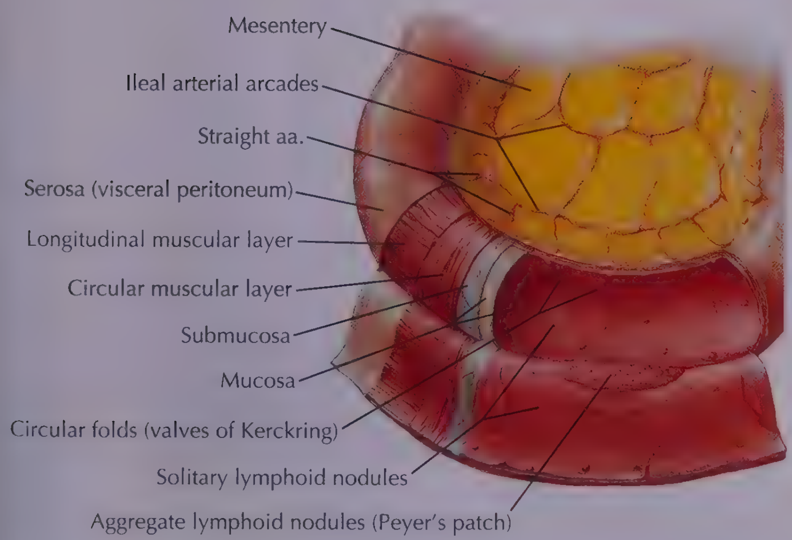
Duodenum


Hepatic portal v.
Proper hepatic a.
Bile duct
Gastroduodenal a.
Right gastric a.
Hepatoduodenal ligament (in right margin of lesser omentum)
Common hepatic a.
Pyloric orifice
Superior part of duodenum (duodenal bulb; note lack of circular folds)
Bile duct
Superior duodenal flexure
Accessory pancreatic duct (of Santorini)
Descending part of duodenum
Pancreatic duct (of Wirsung)
Minor duodenal papilla (inconstant)
Duodenojejunal flexure
Jejunum
Circular folds (valves of Kerckring)
Major duodenal papilla (of Vater)
Head of pancreas
Ascending part of duodenum
Superior mesenteric a. and v.
Inferior duodenal flexure
Horizontal part of duodenum

Jejunum


Mesentery
Jejunal arterial arcade
Straight aa.
Serosa (visceral peritoneum)
Longitudinal muscular layer
Circular muscular layer
Submucosa
Mucosa
Solitary lymphoid nodule
Circular folds (valves of Kerckring)

Ileum


Mesentery
Ileal arterial arcades
Straight aa.
Serosa (visceral peritoneum)
Longitudinal muscular layer
Circular muscular layer
Submucosa
Mucosa
Circular folds (valves of Kerckring)
Solitary lymphoid nodules
Aggregate lymphoid nodules (Peyer's patch)

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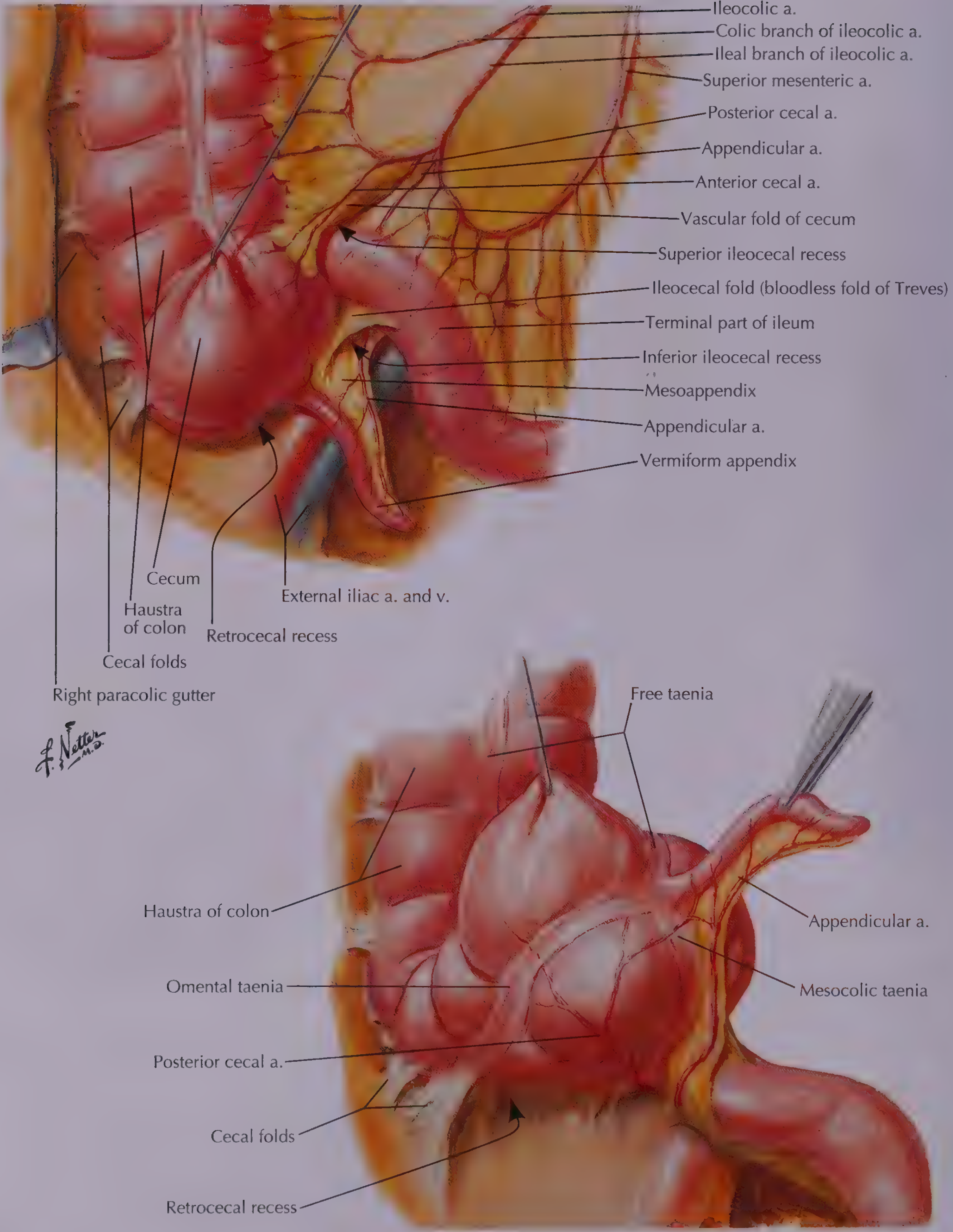
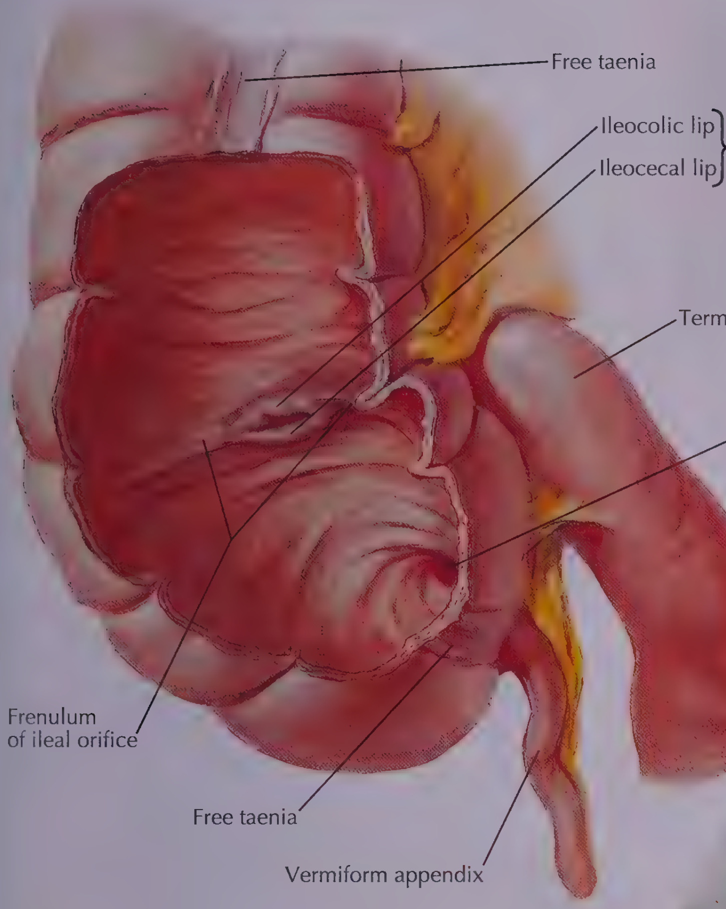
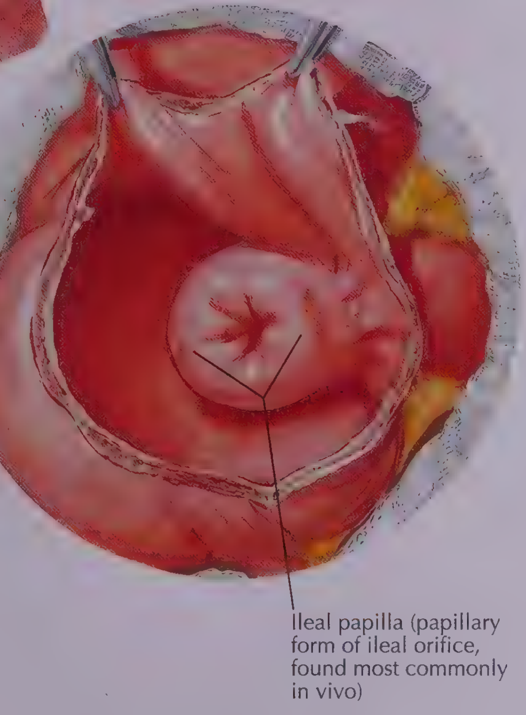
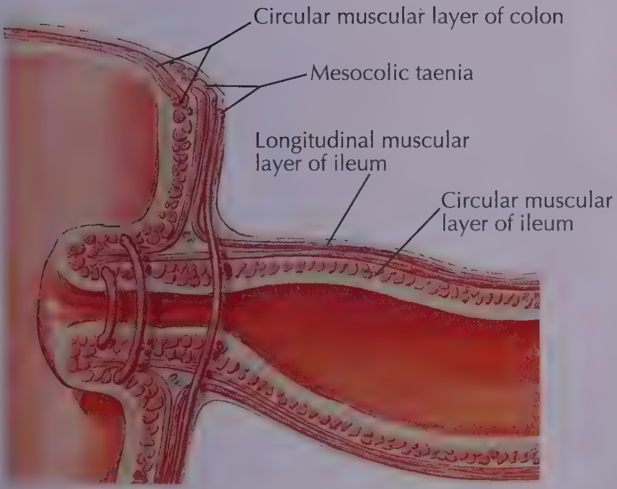
Ileocecal Junction

See also Plates 313, 314, BP 61


Ileocolic a.
Colic branch of ileocolic a.
Ileal branch of ileocolic a.
Superior mesenteric a.
Posterior cecal a.
Appendicular a.
Anterior cecal a.
Vascular fold of cecum
Superior ileocecal recess
Ileocecal fold (bloodless fold of Treves)
Terminal part of ileum
Inferior ileocecal recess
Mesoappendix
Appendicular a.
Vermiform appendix
Cecum
External iliac a. and v.
Haustra of colon
Retrocecal recess
Cecal folds
Right paracolic gutter
Free taenia
Haustra of colon
Appendicular a.
Omental taenia
Mesocolic taenia
Posterior cecal a.
Cecal folds
Retrocecal recess


Free taenia
Ileocolic lip
Ileocecal lip
Ileal lips (labial form of ileal orifice, seen commonly postmortem and occasionally in vivo)
Terminal part of ileum
Orifice of vermiform appendix
Frenulum of ileal orifice
Free taenia
Vermiform appendix


Ileal papilla (papillary form of ileal orifice, found most commonly in vivo)


Circular muscular layer of colon
Mesocolic taenia
Longitudinal muscular layer of ileum
Circular muscular layer of ileum

Schema of muscle fibers at ileal orifice

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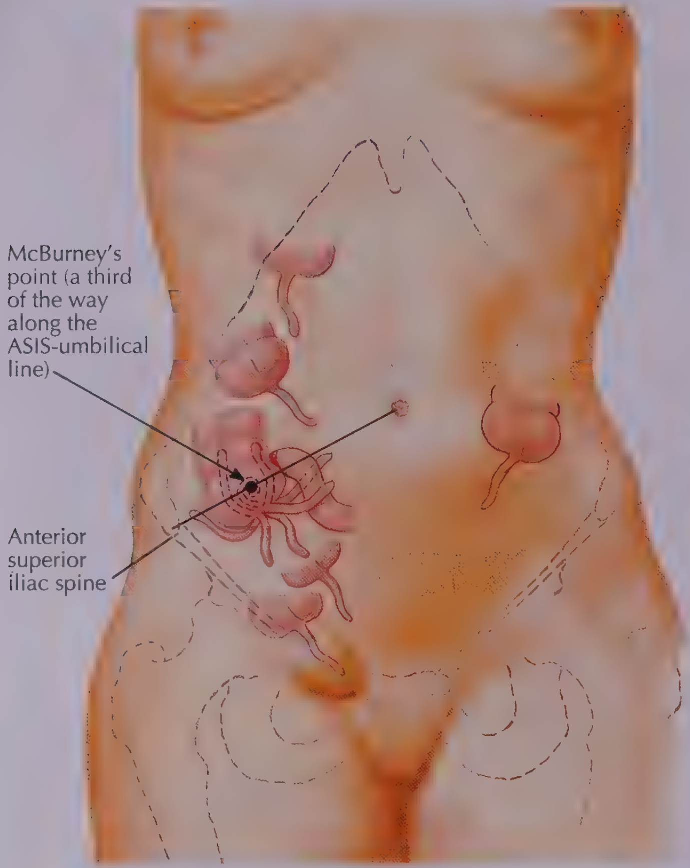
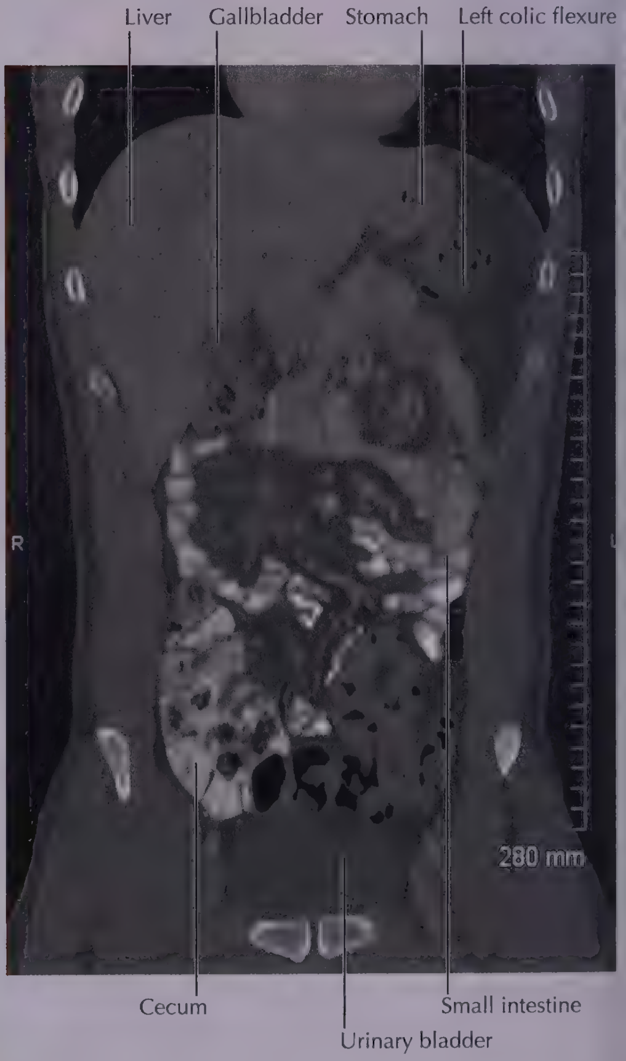
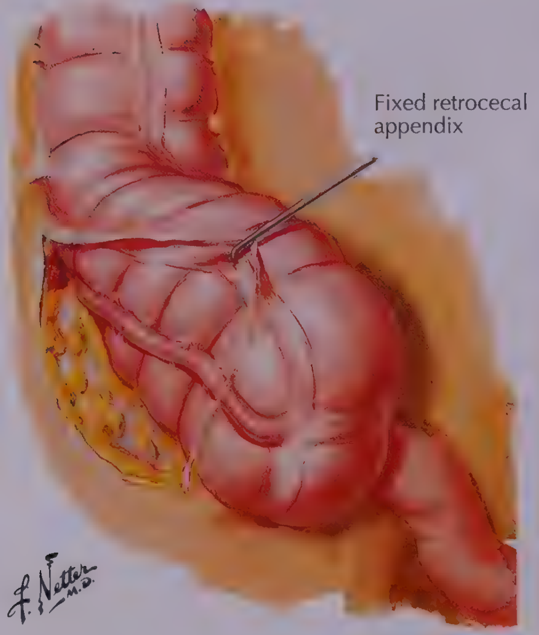

McBurney's point (a third of the way along the ASIS-umbilical line)
Anterior superior iliac spine

Variations in position of vermiform appendix

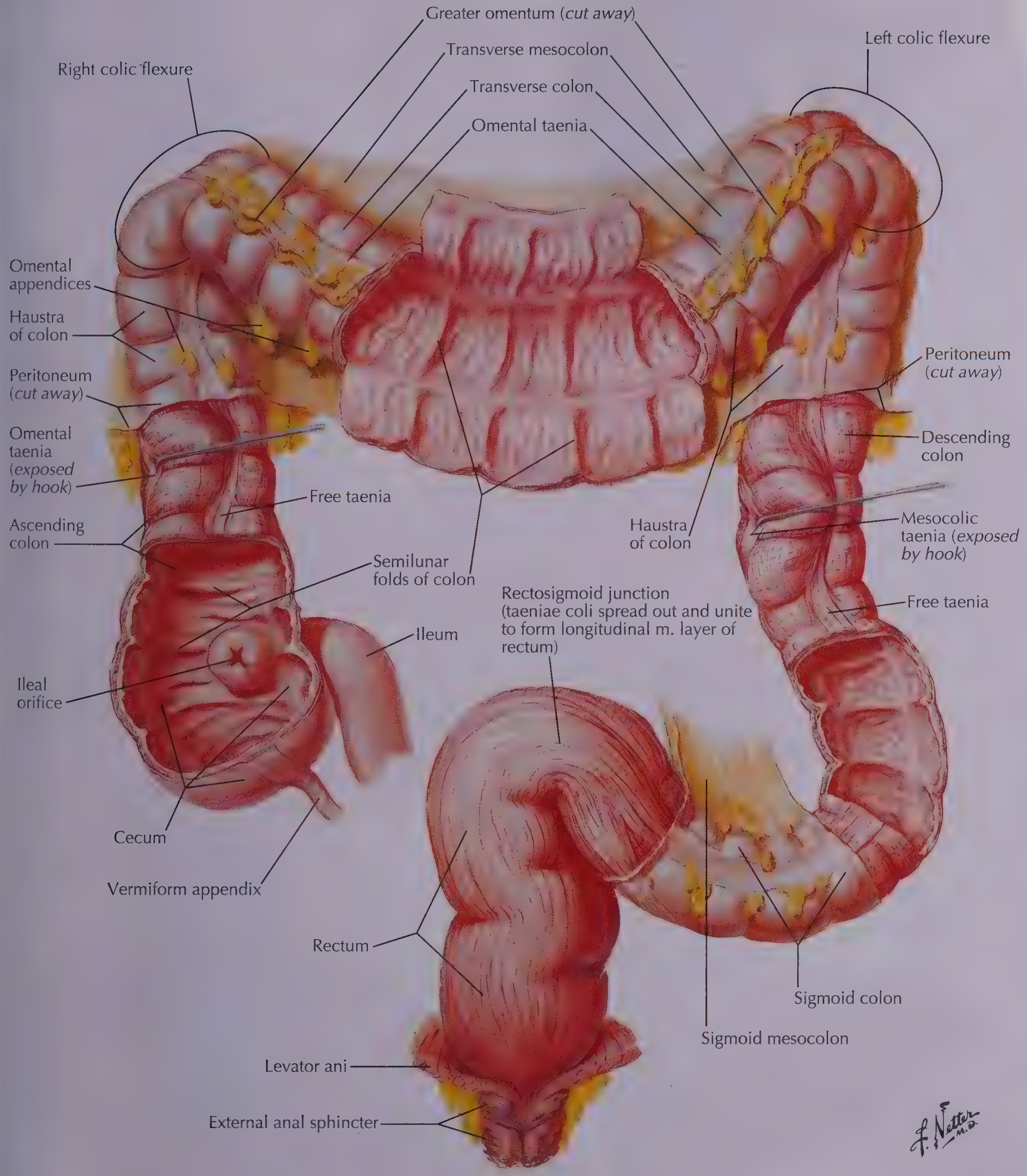
Coronal CT image with oral and intravenous contrast


Liver
Gallbladder
Stomach
Left colic flexure
R
280 mm
Cecum
Small intestine
Urinary bladder


Fixed retrocecal appendix

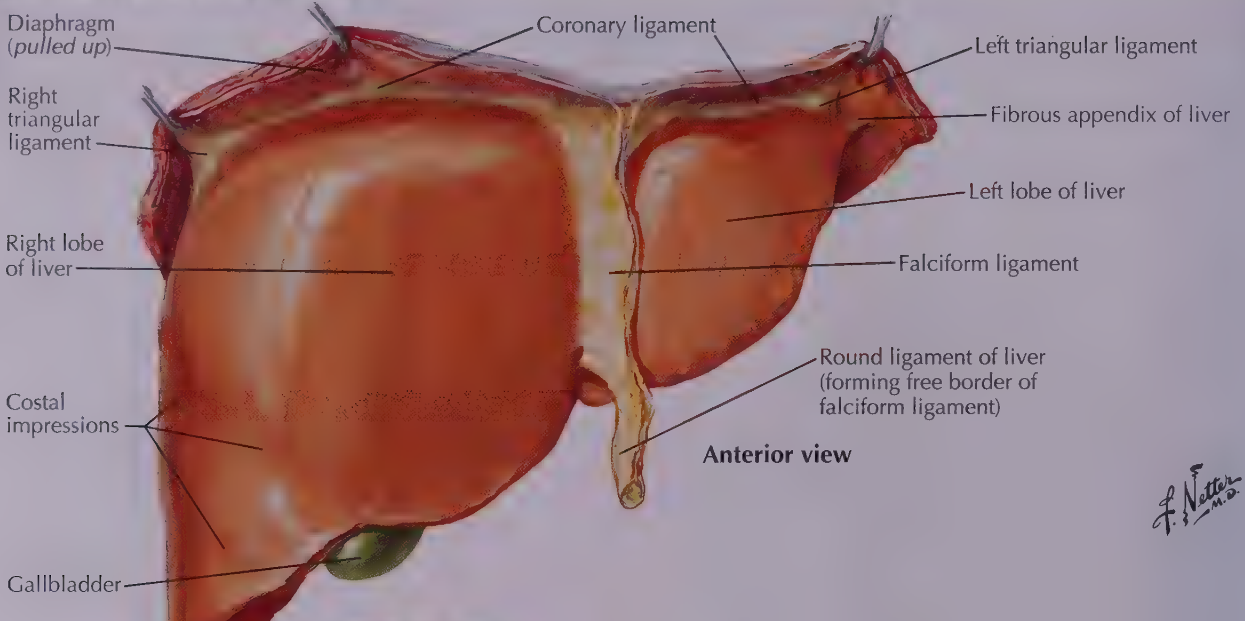
Mucosa and Musculature of Large Intestine

See also Plates 314, BP 60

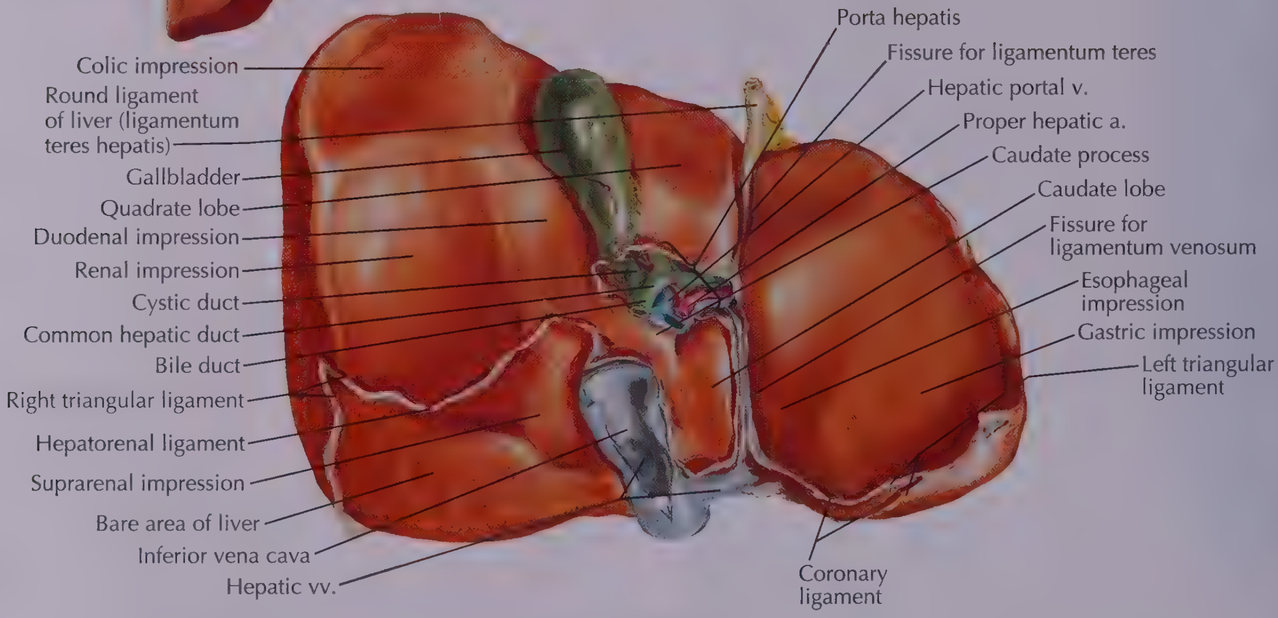

Greater omentum (*cut away*)
Transverse mesocolon
Transverse colon
Omental taenia
Left colic flexure
Right colic flexure
Omental appendices
Haustra of colon
Peritoneum (*cut away*)
Omental taenia (*exposed by hook*)
Free taenia
Ascending colon
Semilunar folds of colon
Ileum
Ileal orifice
Cecum
Vermiform appendix
Peritoneum (*cut away*)
Descending colon
Haustra of colon
Mesocolic taenia (*exposed by hook*)
Free taenia
Rectosigmoid junction (taeniae coli spread out and unite to form longitudinal m. layer of rectum)
Rectum
Sigmoid colon
Sigmoid mesocolon
Levator ani
External anal sphincter

Surfaces and Bed of Liver

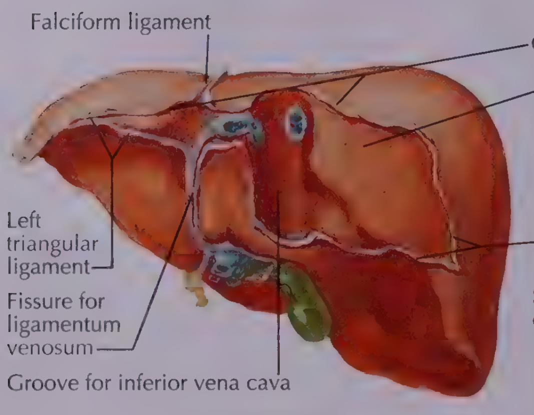
See also Plates 293, BP 59


Diaphragm (*pulled up*)
Coronary ligament
Left triangular ligament
Fibrous appendix of liver
Right triangular ligament
Left lobe of liver
Right lobe of liver
Falciform ligament
Round ligament of liver (forming free border of falciform ligament)
Costal impressions
Gallbladder

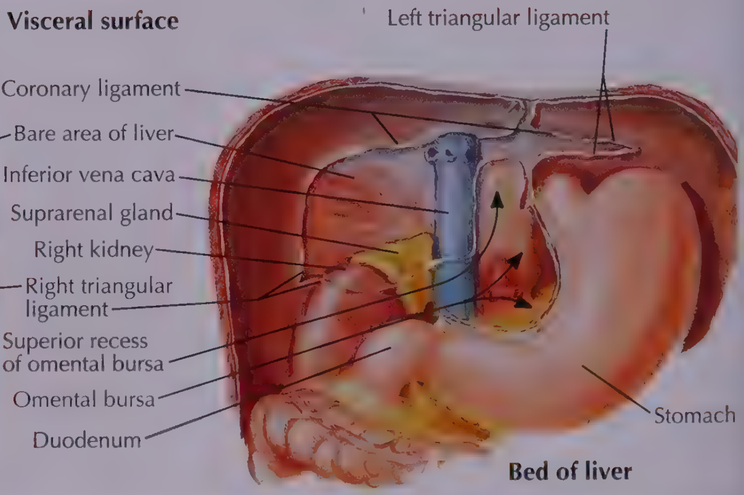
Anterior view


Porta hepatis
Fissure for ligamentum teres
Colic impression
Hepatic portal v.
Round ligament of liver (ligamentum teres hepatis)
Proper hepatic a.
Caudate process
Gallbladder
Caudate lobe
Quadrate lobe
Fissure for ligamentum venosum
Duodenal impression
Esophageal impression
Renal impression
Gastric impression
Cystic duct
Left triangular ligament
Common hepatic duct
Bile duct
Right triangular ligament
Hepatorenal ligament
Suprarenal impression
Bare area of liver
Inferior vena cava
Coronary ligament
Hepatic vv.

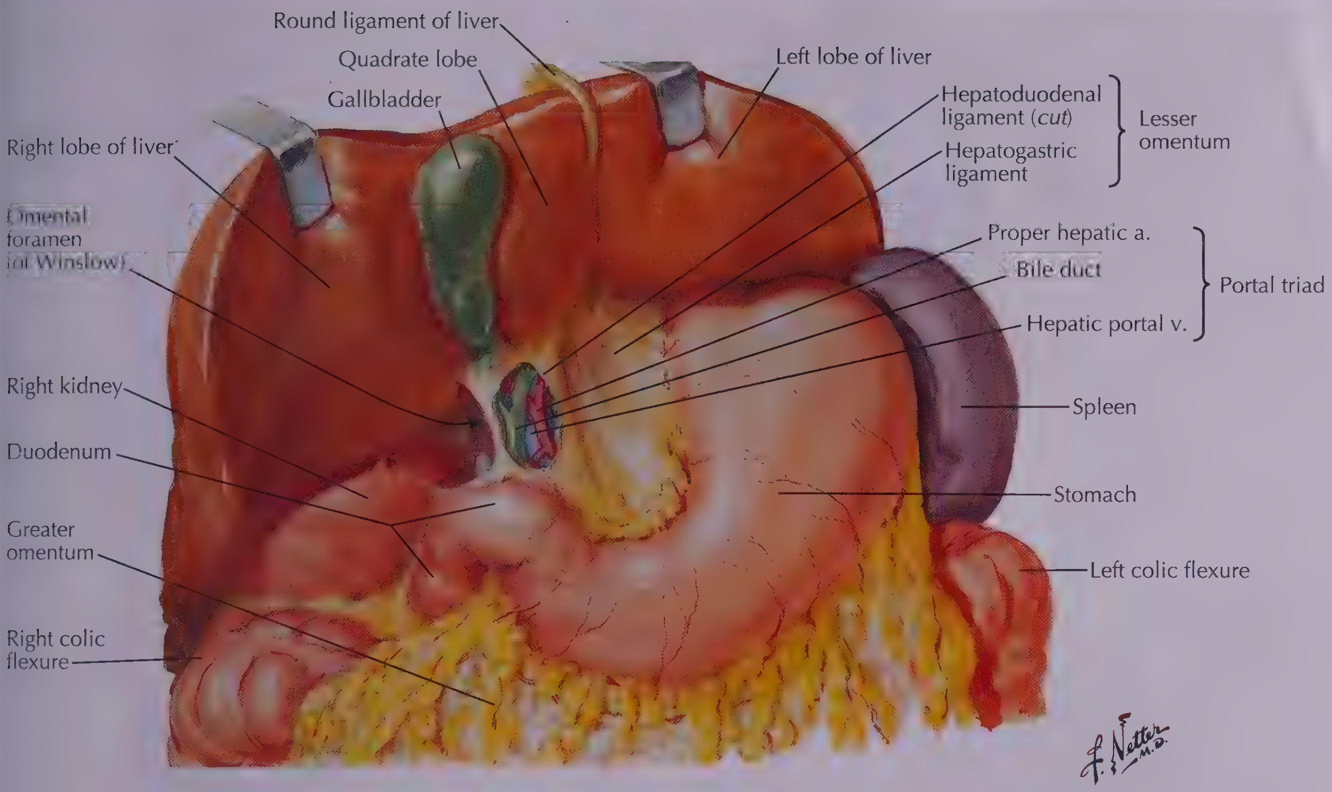
Visceral surface

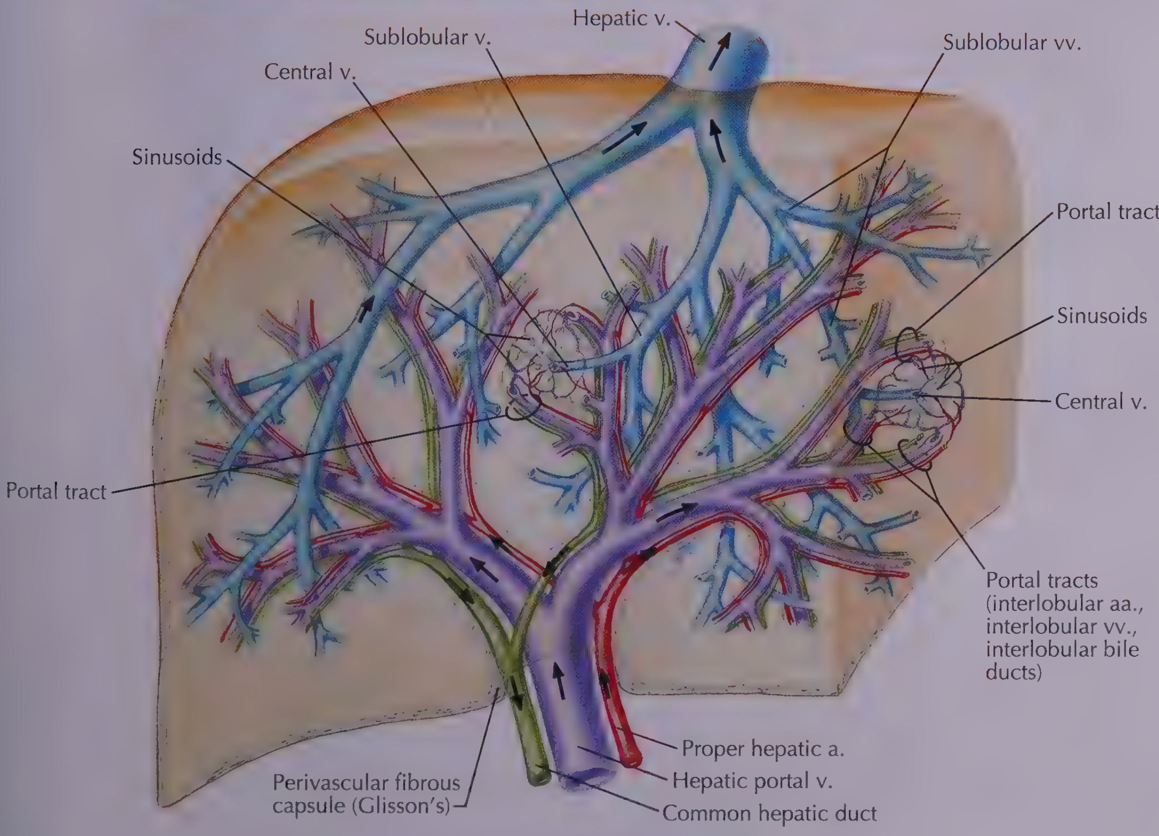

Falciform ligament
Left triangular ligament
Fissure for ligamentum venosum
Groove for inferior vena cava

Posterior view

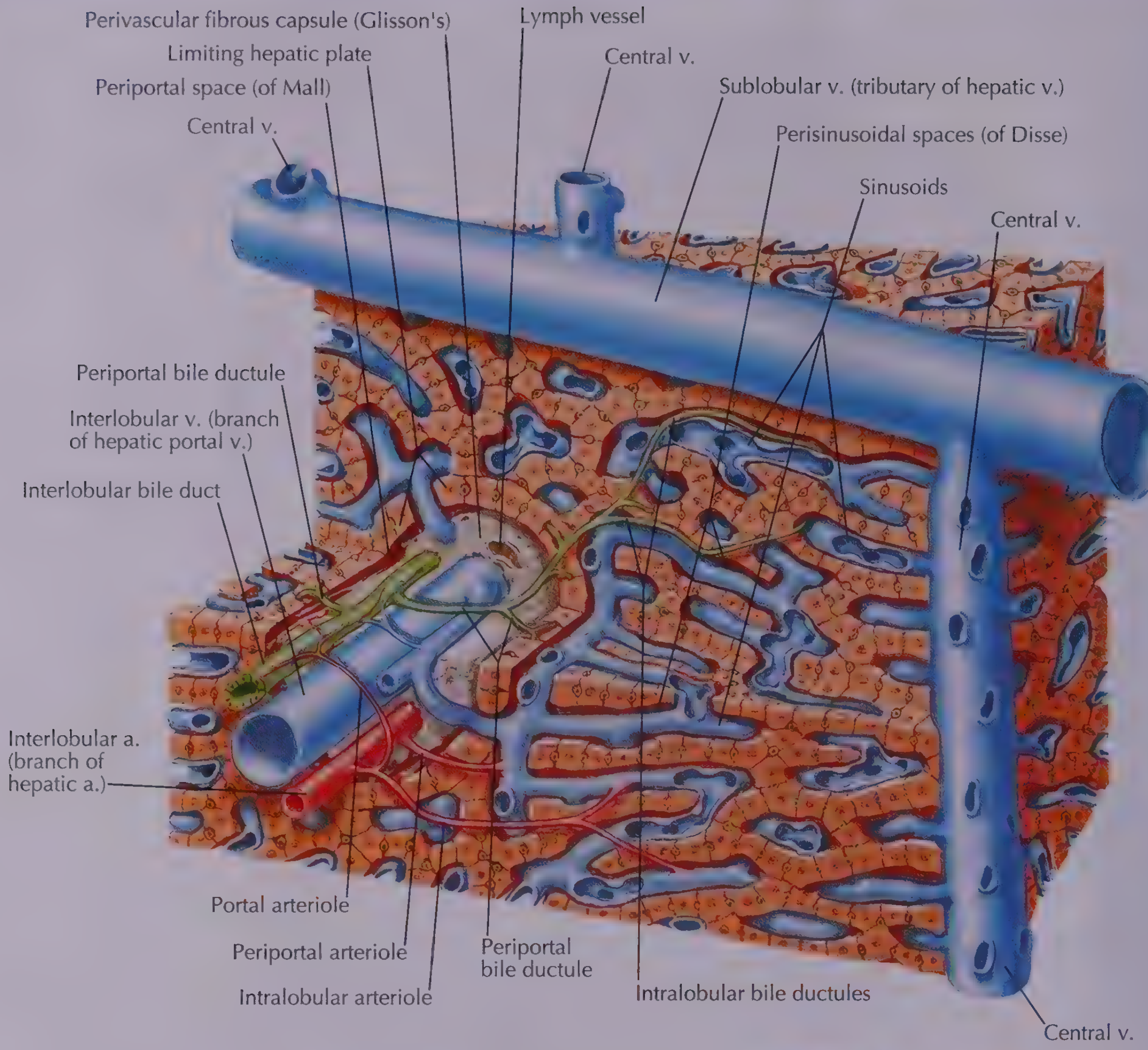

Left triangular ligament
Coronary ligament
Bare area of liver
Inferior vena cava
Suprarenal gland
Right kidney
Right triangular ligament
Superior recess of omental bursa
Omental bursa
Stomach
Duodenum

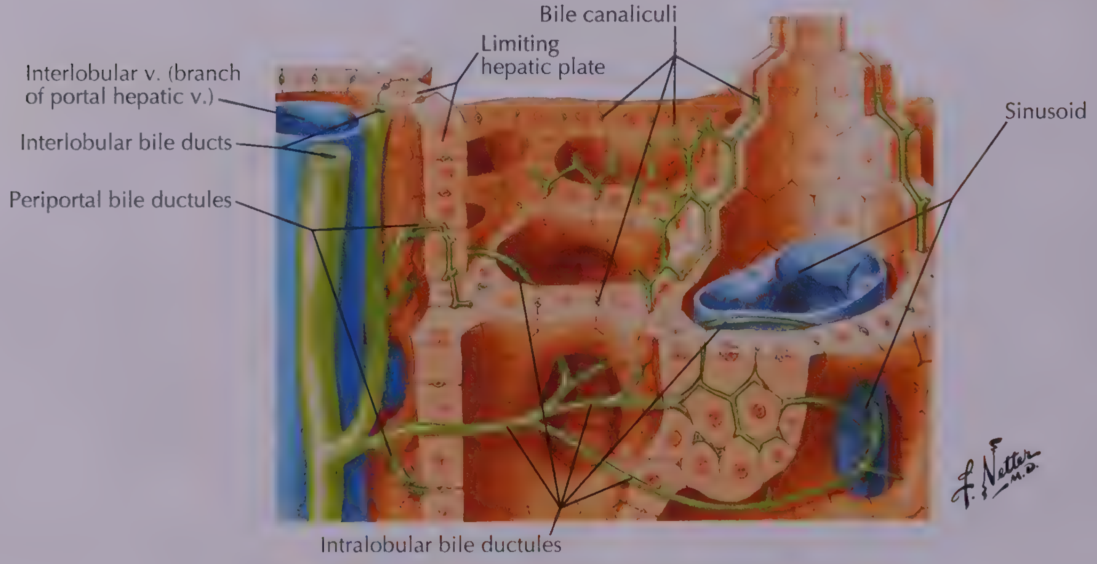
Bed of liver


Round ligament of liver
Quadrate lobe
Gallbladder
Right lobe of liver
Omental foramen (of Winslow)
Right kidney
Duodenum
Greater omentum
Right colic flexure
Left lobe of liver
Hepatoduodenal ligament (cut)
Hepatogastric ligament
Lesser omentum
Proper hepatic a.
Bile duct
Hepatic portal v.
Portal triad
Spleen
Stomach
Left colic flexure
F. Netter M.D.


Hepatic v.
Sublobular v.
Central v.
Sinusoids
Sublobular vv.
Portal tract
Sinusoids
Central v.
Portal tract
Portal tracts (interlobular aa., interlobular vv., interlobular bile ducts)
Proper hepatic a.
Hepatic portal v.
Common hepatic duct
Perivascular fibrous capsule (Glisson's)

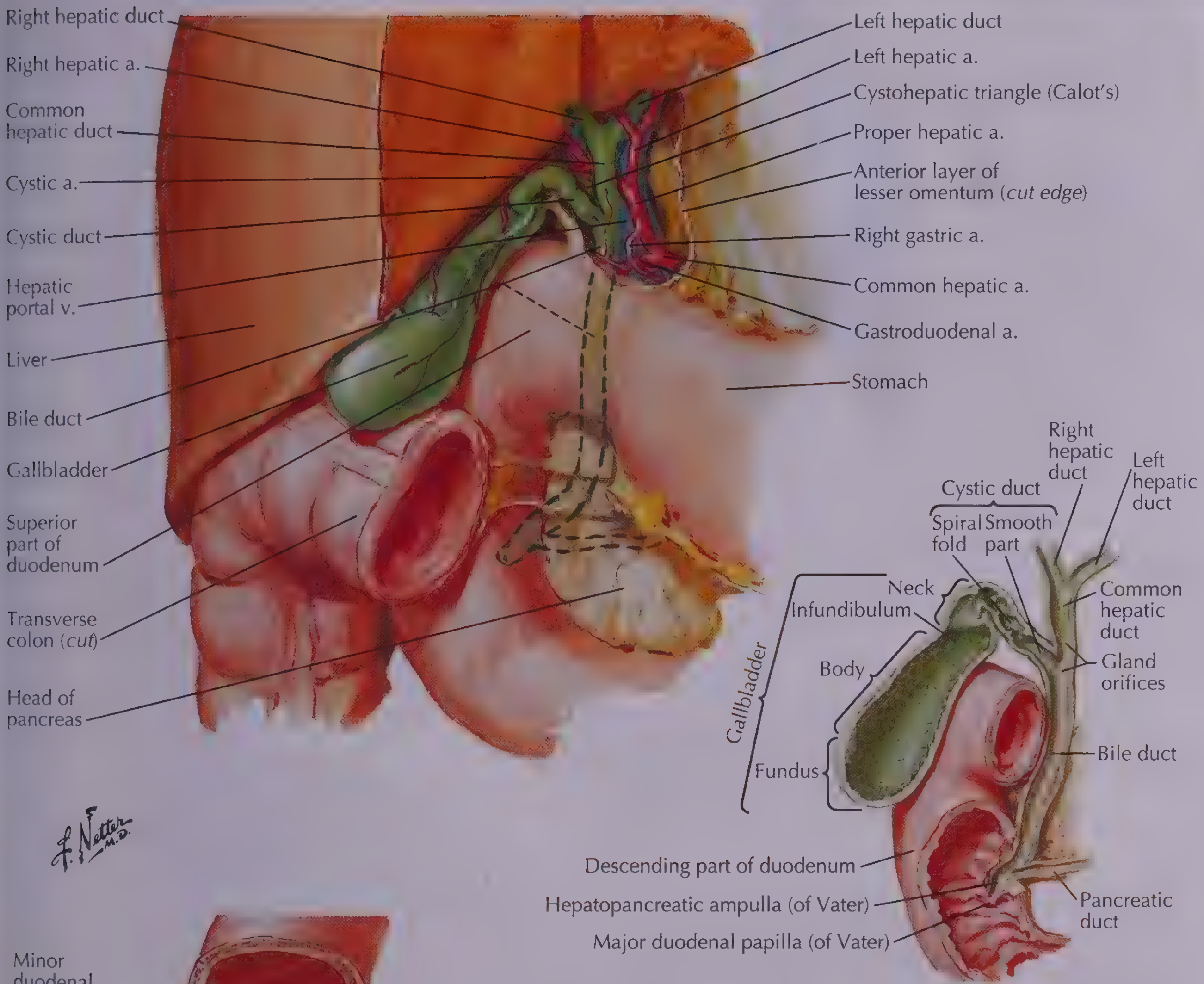
Liver Structure: Schema

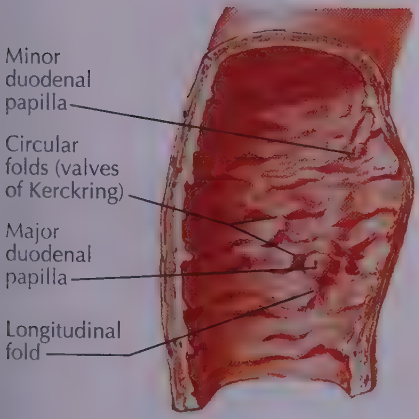

Perivascular fibrous capsule (Glisson's)
Lymph vessel
Limiting hepatic plate
Central v.
Periportal space (of Mall)
Sublobular v. (tributary of hepatic v.)
Central v.
Perisinusoidal spaces (of Disse)
Sinusoids
Central v.
Periportal bile ductule
Interlobular v. (branch of hepatic portal v.)
Interlobular bile duct
Interlobular a. (branch of hepatic a.)
Portal arteriole
Periportal arteriole
Intralobular arteriole
Periportal bile ductule
Intralobular bile ductules
Central v.


Bile canaliculi
Limiting hepatic plate
Interlobular v. (branch of portal hepatic v.)
Interlobular bile ducts
Periportal bile ductules
Sinusoid
Intralobular bile ductules
F. Netter M.D.

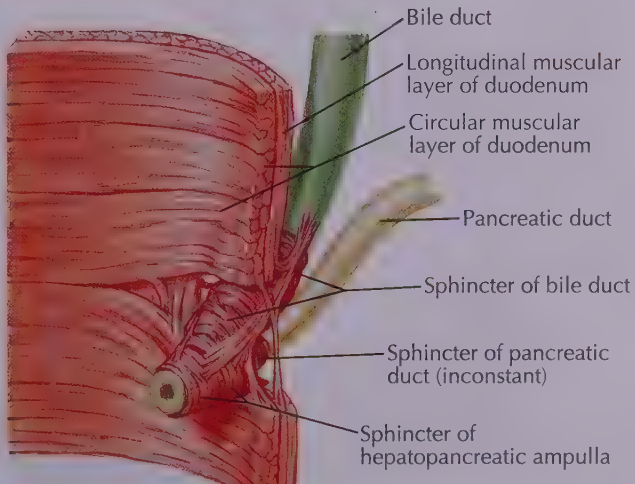
Gallbladder, Extrahepatic Bile Ducts, and Pancreatic Duct

See also Plates BP 57, BP 62, BP 63


Right hepatic duct
Right hepatic a.
Common hepatic duct
Cystic a.
Cystic duct
Hepatic portal v.
Liver
Bile duct
Gallbladder
Superior part of duodenum
Transverse colon (*cut*)
Head of pancreas
Left hepatic duct
Left hepatic a.
Cystohepatic triangle (Calot's)
Proper hepatic a.
Anterior layer of lesser omentum (*cut edge*)
Right gastric a.
Common hepatic a.
Gastroduodenal a.
Stomach
Right hepatic duct
Left hepatic duct
Cystic duct
Spiral fold
Smooth part
Common hepatic duct
Neck
Infundibulum
Body
Gallbladder
Fundus
Gland orifices
Bile duct
Descending part of duodenum
Hepatopancreatic ampulla (of Vater)
Major duodenal papilla (of Vater)
Pancreatic duct


Minor duodenal papilla
Circular folds (valves of Kerckring)
Major duodenal papilla
Longitudinal fold

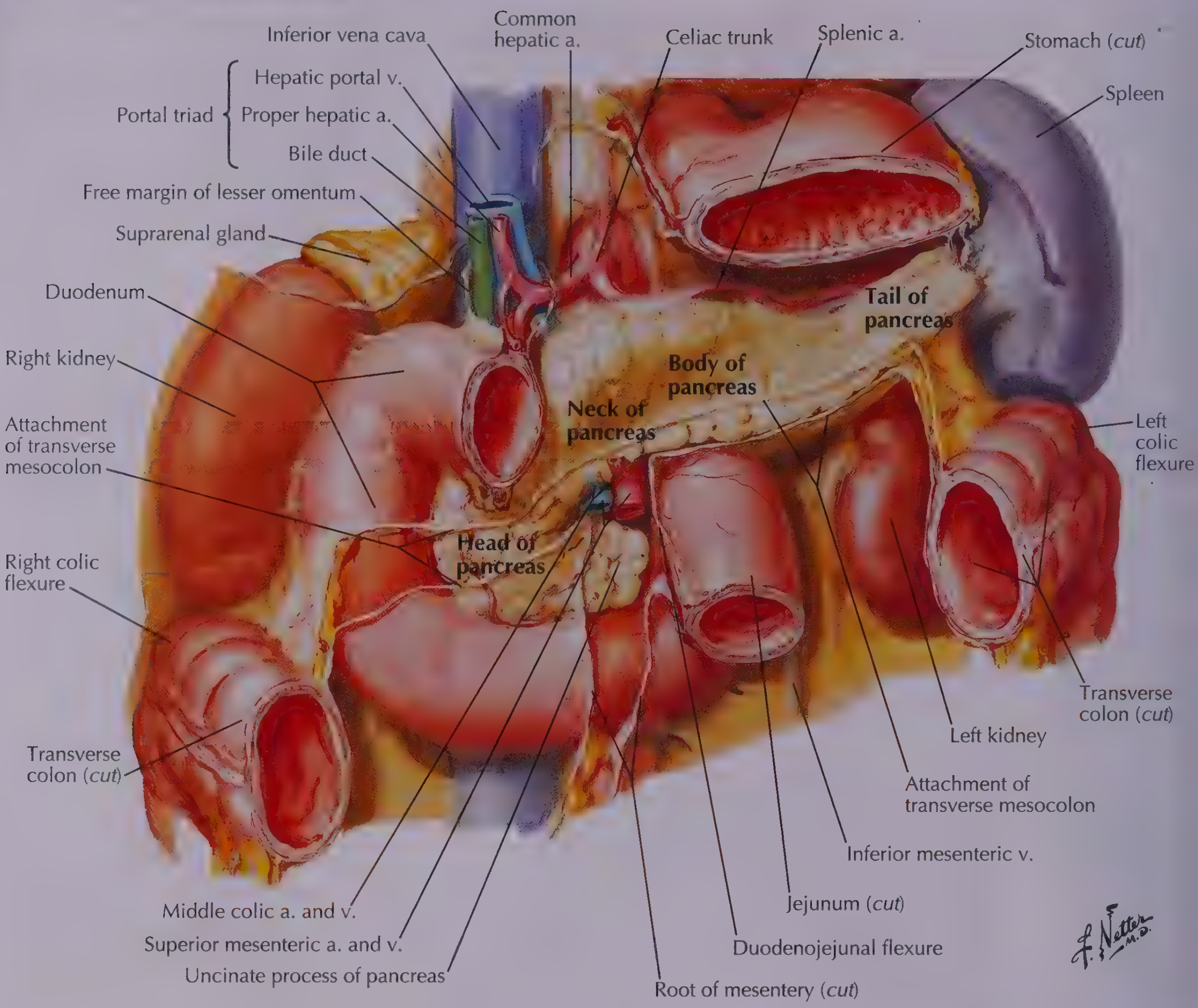
Interior of descending part of duodenum


Bile duct
Longitudinal muscular layer of duodenum
Circular muscular layer of duodenum
Pancreatic duct
Sphincter of bile duct
Sphincter of pancreatic duct (inconstant)
Sphincter of hepatopancreatic ampulla

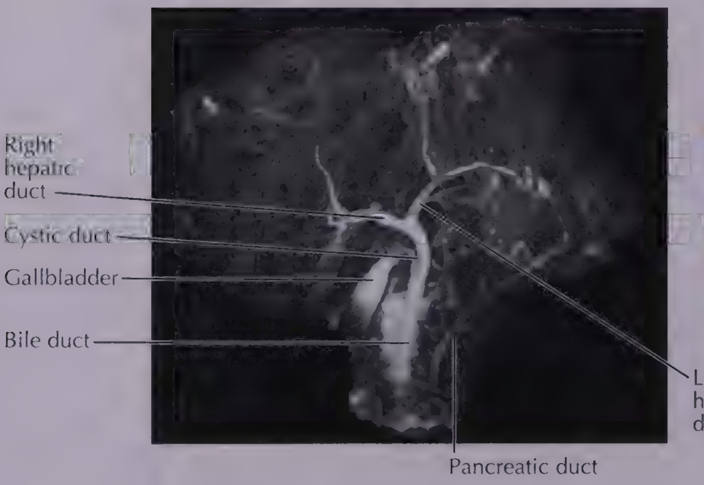
Dissection

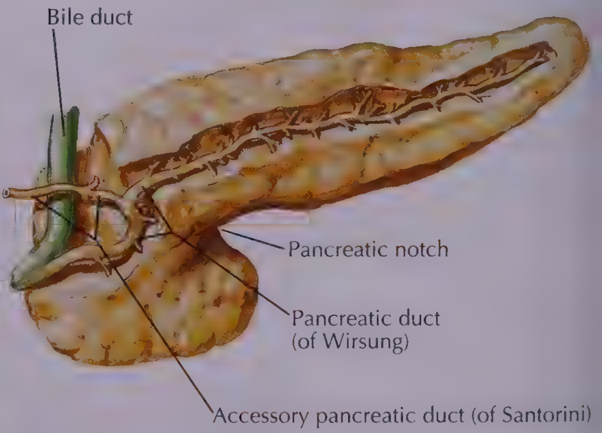
Pancreas in Situ

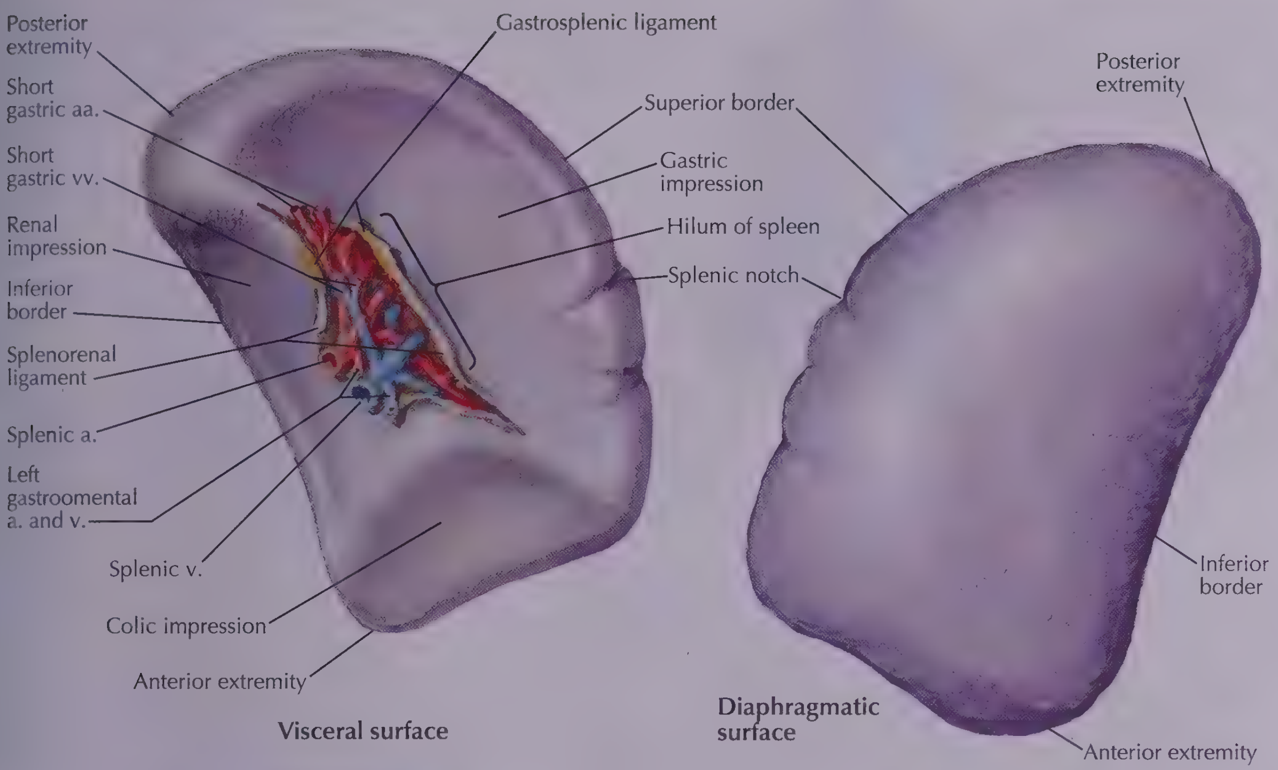
See also Plates BP 62, BP 63


Inferior vena cava
Common hepatic a.
Celiac trunk
Splenic a.
Stomach (*cut*)
Spleen
Portal triad
Hepatic portal v.
Proper hepatic a.
Bile duct
Free margin of lesser omentum
Suprarenal gland
Duodenum
Right kidney
Attachment of transverse mesocolon
Right colic flexure
Transverse colon (*cut*)
Tail of pancreas
Body of pancreas
Neck of pancreas
Head of pancreas
Left colic flexure
Transverse colon (*cut*)
Left kidney
Attachment of transverse mesocolon
Inferior mesenteric v.
Jejunum (*cut*)
Duodenojejunal flexure
Root of mesentery (*cut*)
Middle colic a. and v.
Superior mesenteric a. and v.
Uncinate process of pancreas
F. Netter M.D.

Magnetic resonance cholangiopancreatography (MRCP)

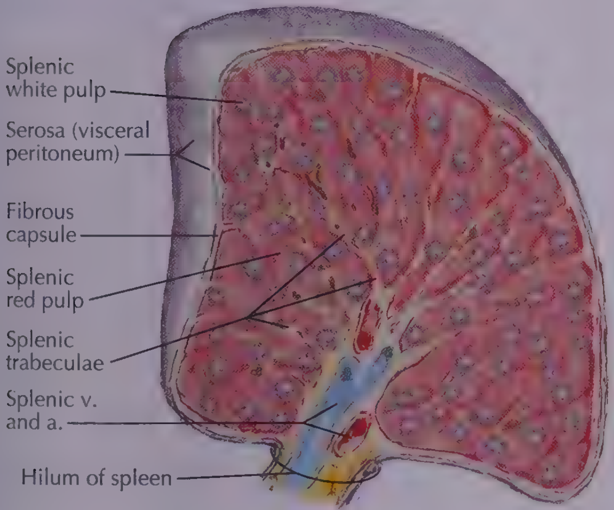

Right hepatic duct
Cystic duct
Gallbladder
Bile duct
Left hepatic duct
Pancreatic duct


Bile duct
Pancreatic notch
Pancreatic duct (of Wirsung)
Accessory pancreatic duct (of Santorini)

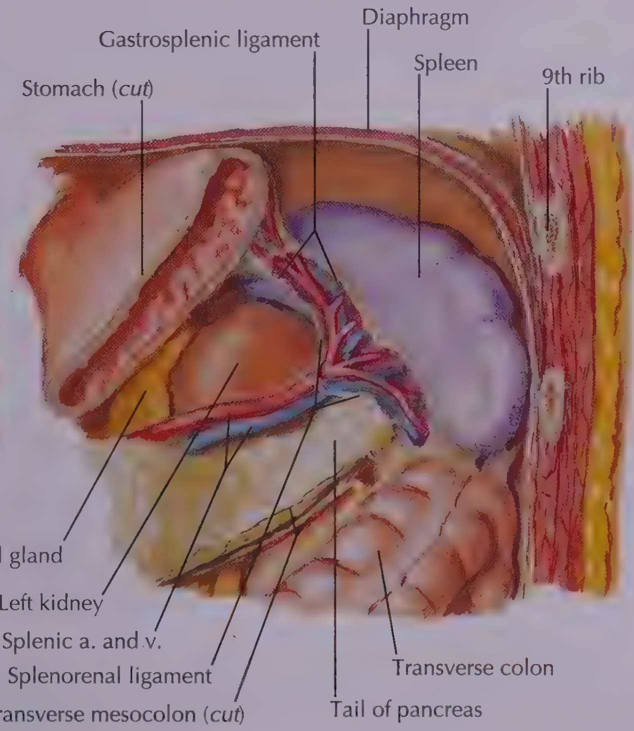

Posterior extremity
Short gastric aa.
Short gastric vv.
Renal impression
Inferior border
Splenorenal ligament
Splenic a.
Left gastroomental a. and v.
Splenic v.
Colic impression
Anterior extremity
Gastrosplenic ligament
Superior border
Gastric impression
Hilum of spleen
Splenic notch
Posterior extremity
Inferior border
Anterior extremity

Visceral surface

Diaphragmatic surface


Splenic white pulp
Serosa (visceral peritoneum)
Fibrous capsule
Splenic red pulp
Splenic trabeculae
Splenic v. and a.
Hilum of spleen

Cross section

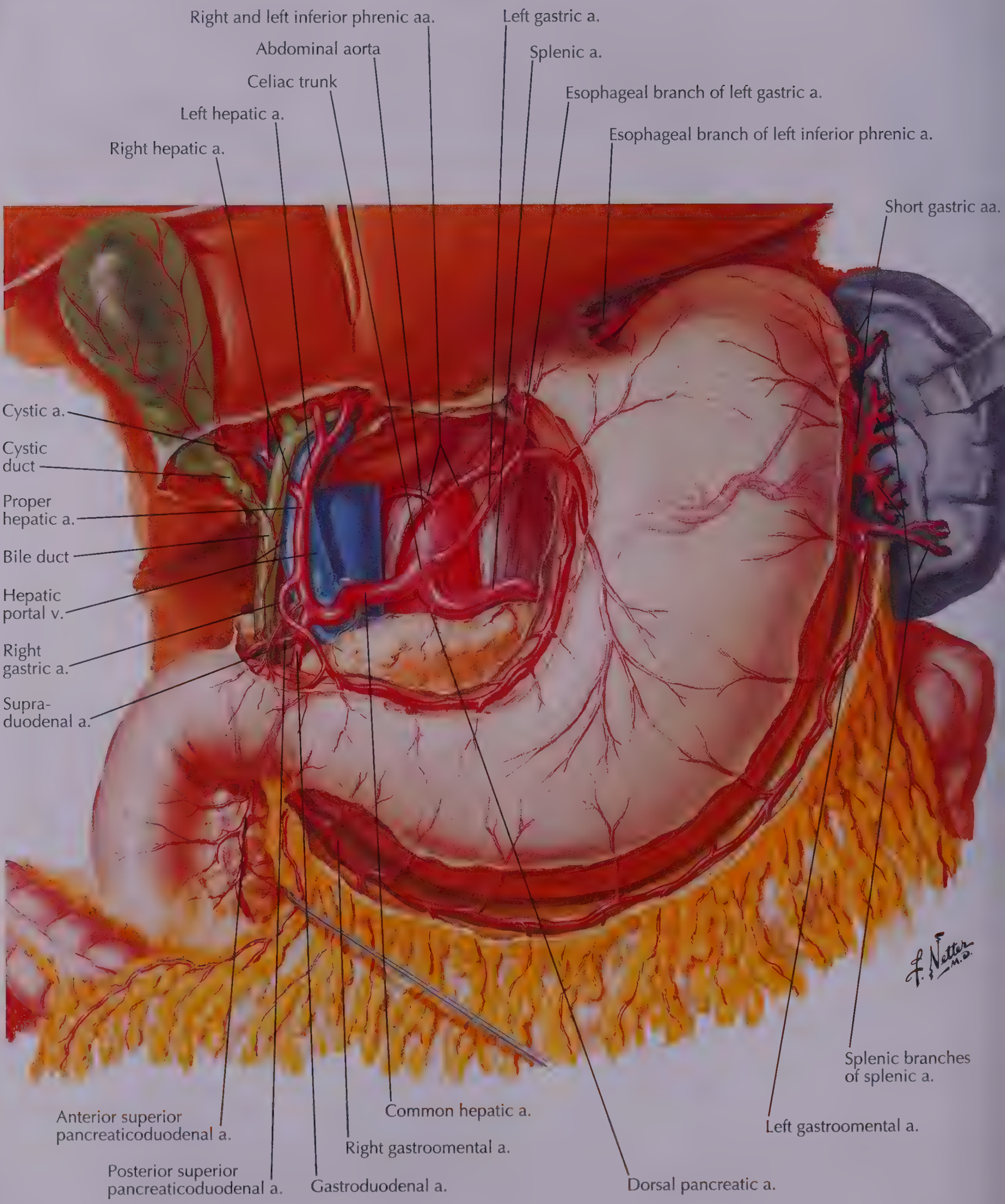

Diaphragm
Gastrosplenic ligament
Spleen
9th rib
Stomach (*cut*)
Suprarenal gland
Left kidney
Splenic a. and v.
Splenorenal ligament
Attachment of transverse mesocolon (*cut*)
Transverse colon
Tail of pancreas

Spleen in situ

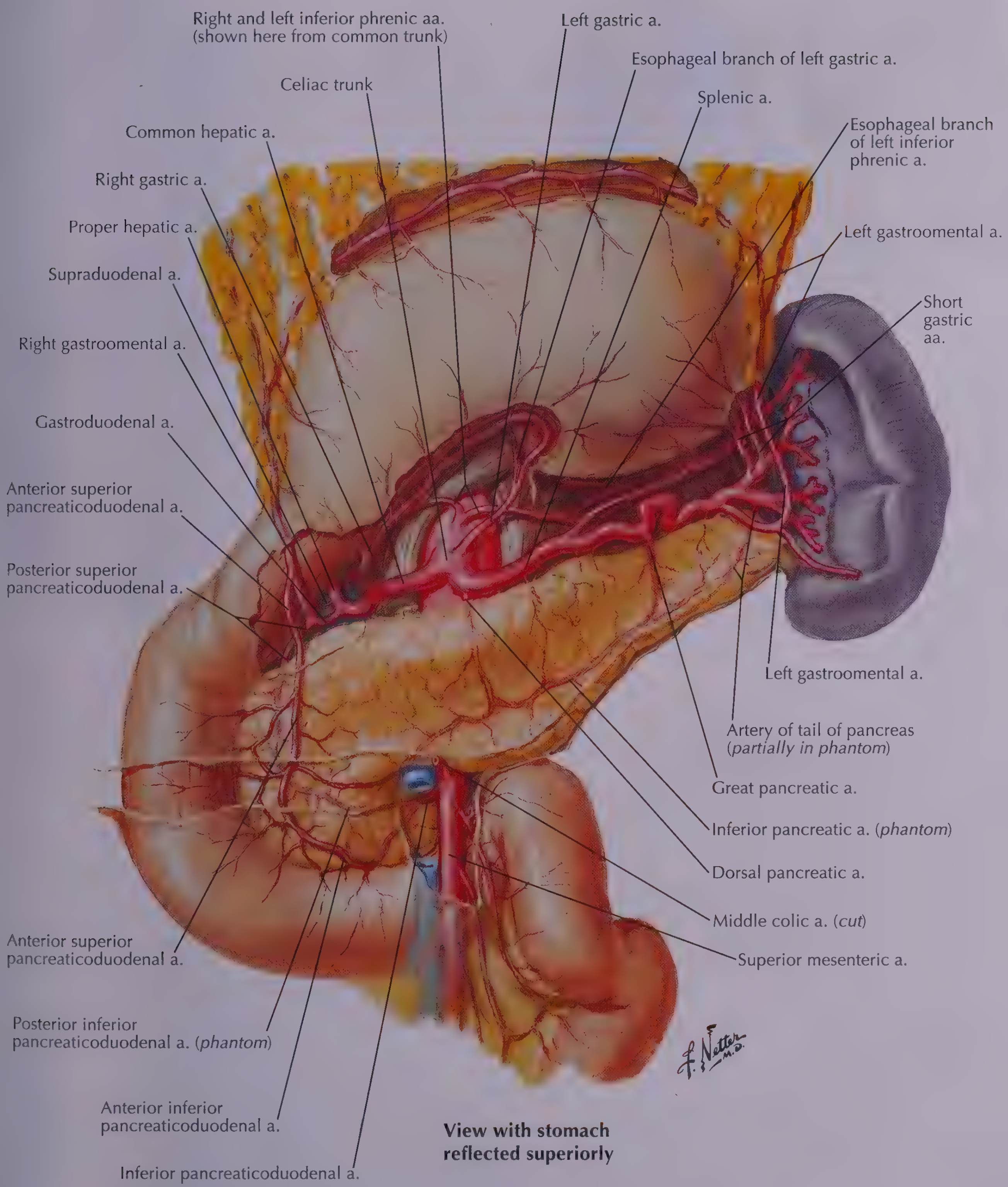
F. Netter M.D.

Arteries of Stomach, Liver, and Spleen

See also Plates BP 64, BP 65, BP 67



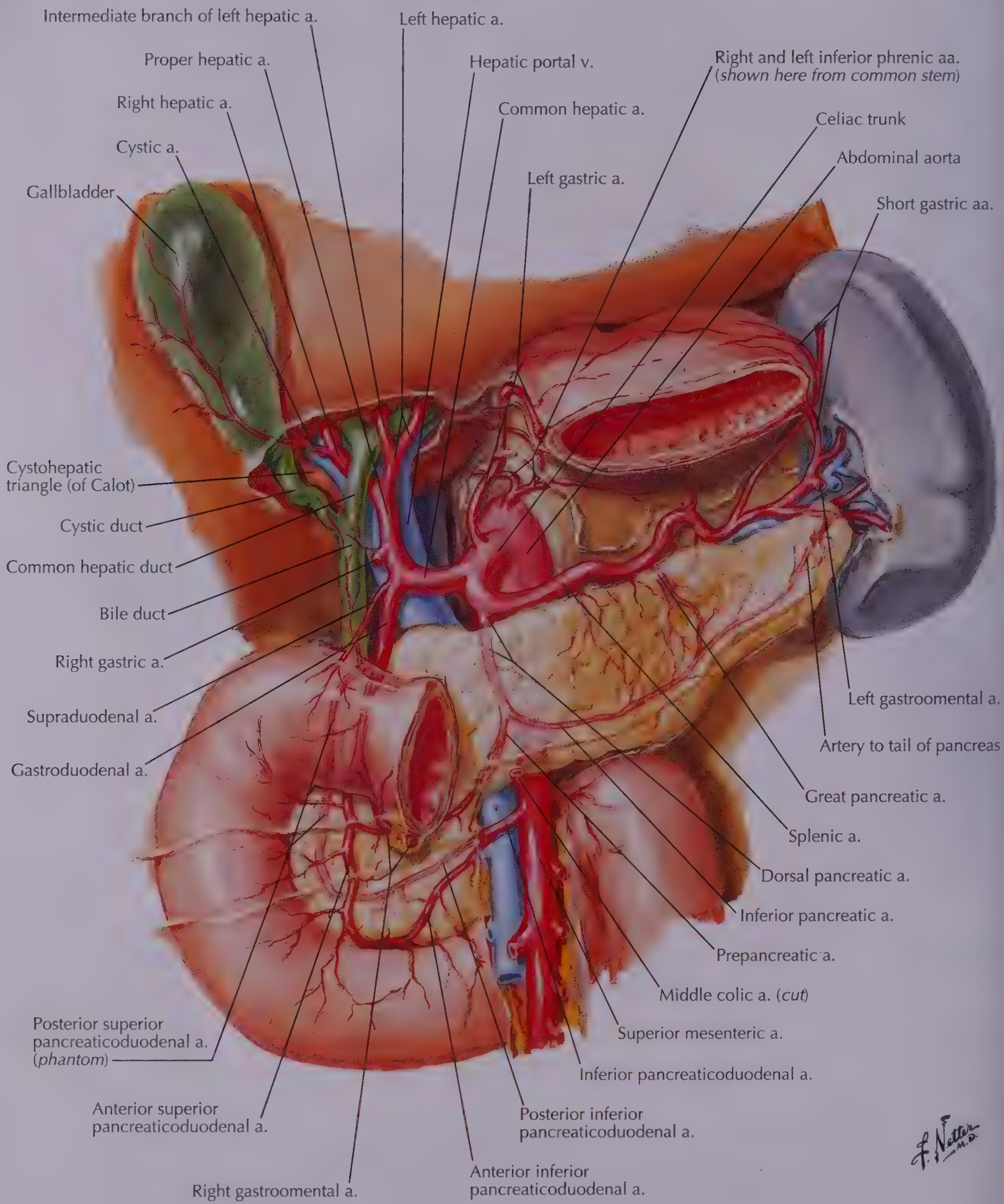
Right and left inferior phrenic aa.
Abdominal aorta
Celiac trunk
Left hepatic a.
Right hepatic a.
Left gastric a.
Splenic a.
Esophageal branch of left gastric a.
Esophageal branch of left inferior phrenic a.
Short gastric aa.
Cystic a.
Cystic duct
Proper hepatic a.
Bile duct
Hepatic portal v.
Right gastric a.
Supra-duodenal a.
Splenic branches of splenic a.
Anterior superior pancreaticoduodenal a.
Common hepatic a.
Left gastroomental a.
Right gastroomental a.
Posterior superior pancreaticoduodenal a.
Gastroduodenal a.
Dorsal pancreatic a.
F. Netter M.D.


Right and left inferior phrenic aa. (shown here from common trunk)
Left gastric a.
Esophageal branch of left gastric a.
Celiac trunk
Splenic a.
Common hepatic a.
Esophageal branch of left inferior phrenic a.
Right gastric a.
Proper hepatic a.
Left gastroomental a.
Supraduodenal a.
Short gastric aa.
Right gastroomental a.
Gastroduodenal a.
Anterior superior pancreaticoduodenal a.
Posterior superior pancreaticoduodenal a.
Left gastroomental a.
Artery of tail of pancreas (*partially in phantom*)
Great pancreatic a.
Inferior pancreatic a. (*phantom*)
Dorsal pancreatic a.
Middle colic a. (*cut*)
Anterior superior pancreaticoduodenal a.
Superior mesenteric a.
Posterior inferior pancreaticoduodenal a. (*phantom*)
Anterior inferior pancreaticoduodenal a.
Inferior pancreaticoduodenal a.

View with stomach reflected superiorly

Arteries of Liver, Pancreas, Duodenum, and Spleen

See also Plates BP 64, BP 65, BP 67



Intermediate branch of left hepatic a.
Left hepatic a.
Proper hepatic a.
Hepatic portal v.
Right and left inferior phrenic aa. (*shown here from common stem*)
Right hepatic a.
Common hepatic a.
Celiac trunk
Cystic a.
Abdominal aorta
Left gastric a.
Gallbladder
Short gastric aa.
Cystohepatic triangle (of Calot)
Cystic duct
Common hepatic duct
Bile duct
Right gastric a.
Left gastroomental a.
Supraduodenal a.
Artery to tail of pancreas
Gastroduodenal a.
Great pancreatic a.
Splenic a.
Dorsal pancreatic a.
Inferior pancreatic a.
Prepancreatic a.
Middle colic a. (*cut*)
Superior mesenteric a.
Posterior superior pancreaticoduodenal a. (*phantom*)
Inferior pancreaticoduodenal a.
Anterior superior pancreaticoduodenal a.
Posterior inferior pancreaticoduodenal a.
Anterior inferior pancreaticoduodenal a.
Right gastroomental a.
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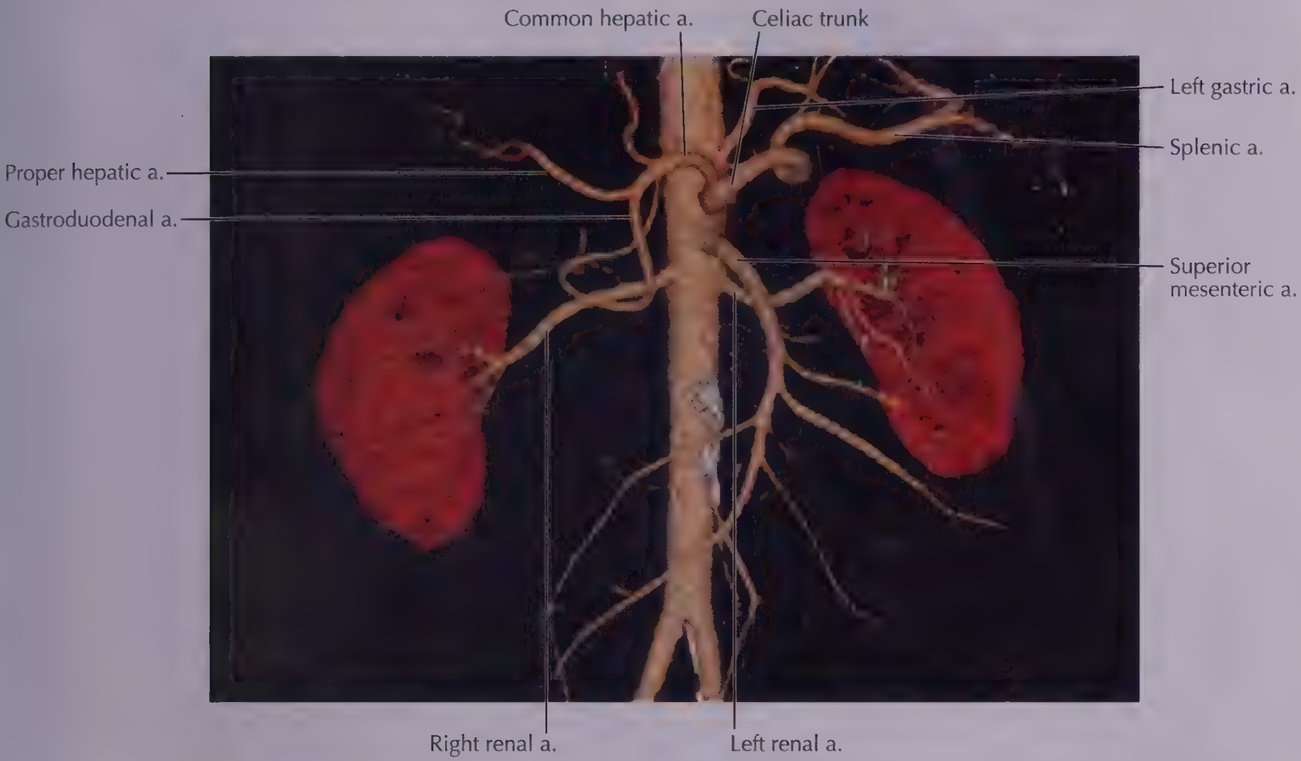
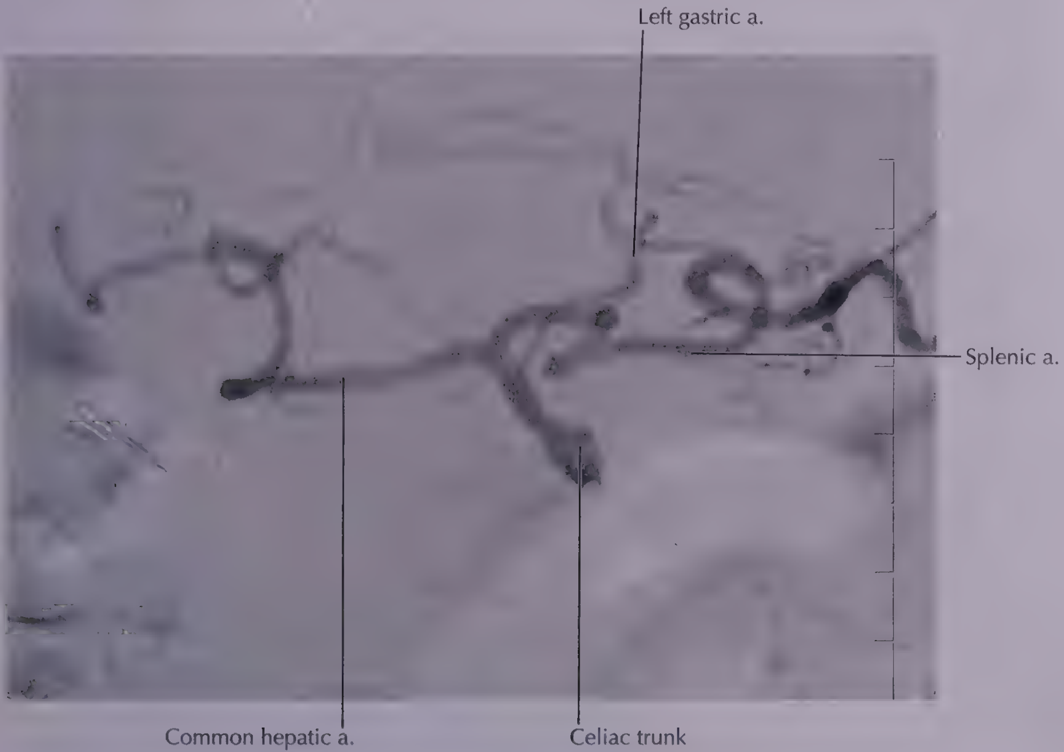
See also Plates 308, 310

3D volume-rendered CT image with intravenous contrast enhancement

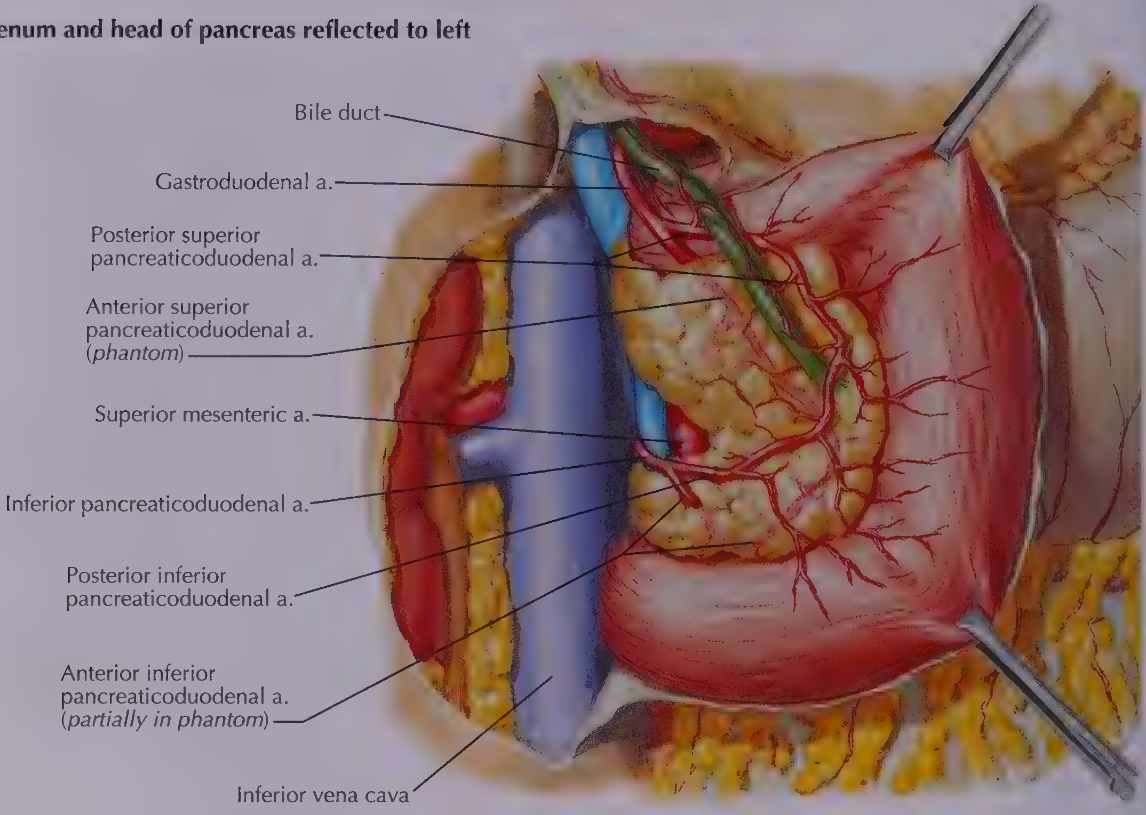

Common hepatic a.
Celiac trunk
Left gastric a.
Splenic a.
Proper hepatic a.
Gastroduodenal a.
Superior mesenteric a.
Right renal a.
Left renal a.

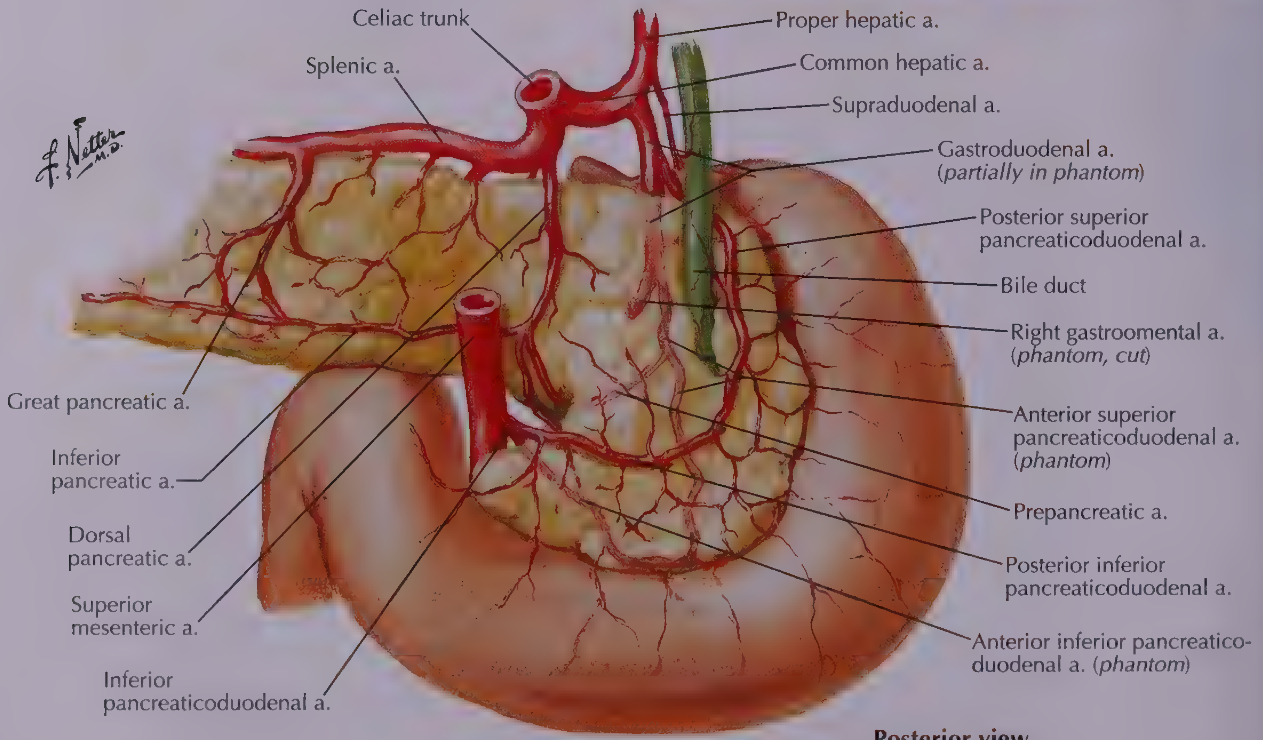
Selective digital subtraction angiogram, celiac trunk


Left gastric a.
Splenic a.
Common hepatic a.
Celiac trunk

Arteries of Duodenum and Head of Pancreas

Duodenum and head of pancreas reflected to left


Bile duct
Gastroduodenal a.
Posterior superior pancreaticoduodenal a.
Anterior superior pancreaticoduodenal a. (*phantom*)
Superior mesenteric a.
Inferior pancreaticoduodenal a.
Posterior inferior pancreaticoduodenal a.
Anterior inferior pancreaticoduodenal a. (*partially in phantom*)
Inferior vena cava


Celiac trunk
Splenic a.
Proper hepatic a.
Common hepatic a.
Supraduodenal a.
Gastroduodenal a. (*partially in phantom*)
Posterior superior pancreaticoduodenal a.
Bile duct
Right gastroomental a. (*phantom, cut*)
Anterior superior pancreaticoduodenal a. (*phantom*)
Prepancreatic a.
Posterior inferior pancreaticoduodenal a.
Anterior inferior pancreaticoduodenal a. (*phantom*)
Great pancreatic a.
Inferior pancreatic a.
Dorsal pancreatic a.
Superior mesenteric a.
Inferior pancreaticoduodenal a.
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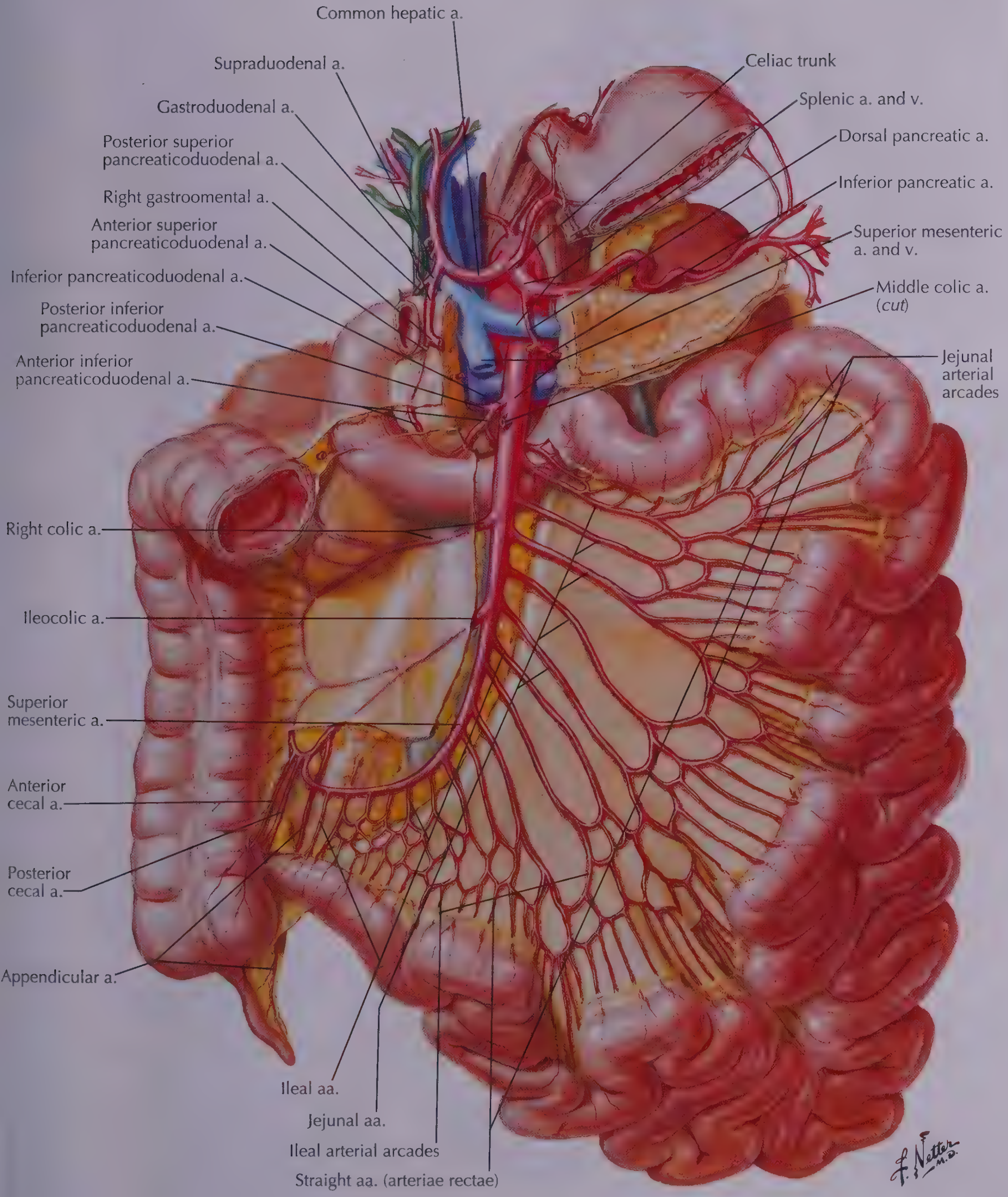
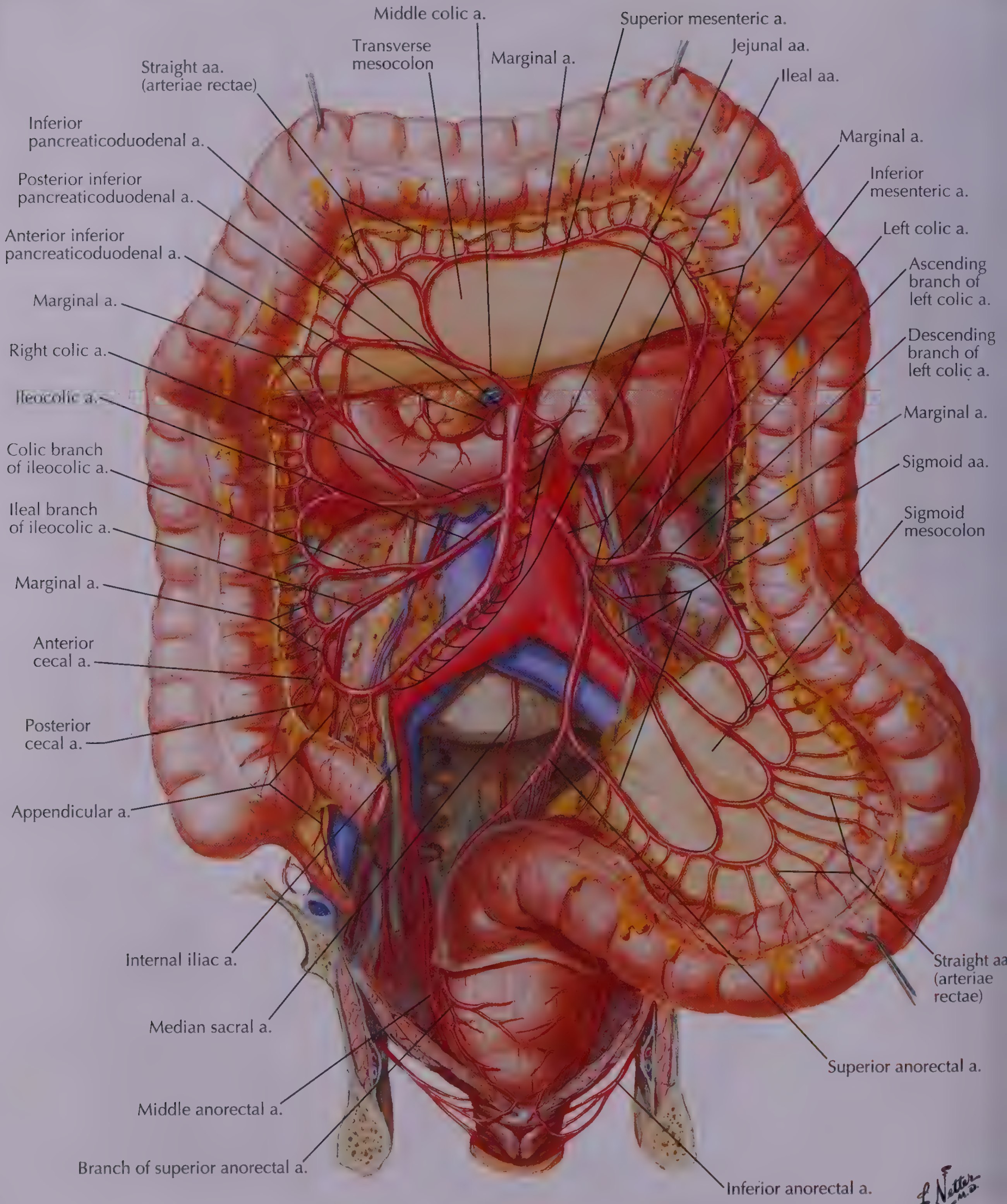
Posterior view


Common hepatic a.
Supraduodenal a.
Gastroduodenal a.
Posterior superior pancreaticoduodenal a.
Right gastroomental a.
Anterior superior pancreaticoduodenal a.
Inferior pancreaticoduodenal a.
Posterior inferior pancreaticoduodenal a.
Anterior inferior pancreaticoduodenal a.
Right colic a.
Ileocolic a.
Superior mesenteric a.
Anterior cecal a.
Posterior cecal a.
Appendicular a.
Celiac trunk
Splenic a. and v.
Dorsal pancreatic a.
Inferior pancreatic a.
Superior mesenteric a. and v.
Middle colic a. (*cut*)
Jejunal arterial arcades
Ileal aa.
Jejunal aa.
Ileal arterial arcades
Straight aa. (arteriae rectae)
F. Netter M.D.

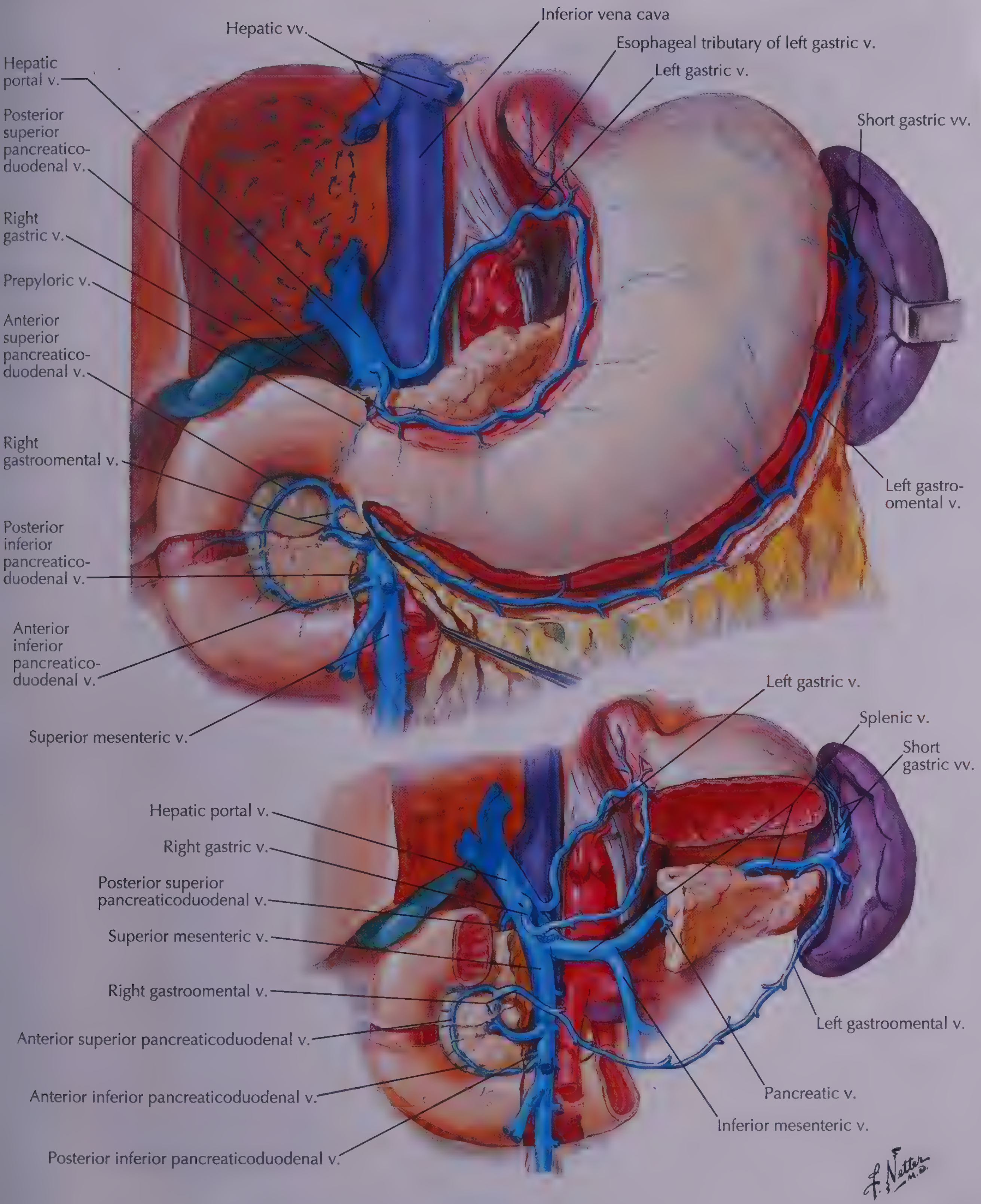
Arteries of Large Intestine

See also Plates 400, BP 61, BP 68, BP 69


Middle colic a.
Superior mesenteric a.
Transverse mesocolon
Marginal a.
Jejunal aa.
Straight aa. (arteriae rectae)
Ileal aa.
Inferior pancreaticoduodenal a.
Marginal a.
Posterior inferior pancreaticoduodenal a.
Inferior mesenteric a.
Anterior inferior pancreaticoduodenal a.
Left colic a.
Ascending branch of left colic a.
Marginal a.
Right colic a.
Descending branch of left colic a.
Ileocolic a.
Marginal a.
Colic branch of ileocolic a.
Sigmoid aa.
Ileal branch of ileocolic a.
Sigmoid mesocolon
Marginal a.
Anterior cecal a.
Posterior cecal a.
Appendicular a.
Internal iliac a.
Straight aa (arteriae rectae)
Median sacral a.
Superior anorectal a.
Middle anorectal a.
Branch of superior anorectal a.
Inferior anorectal a.

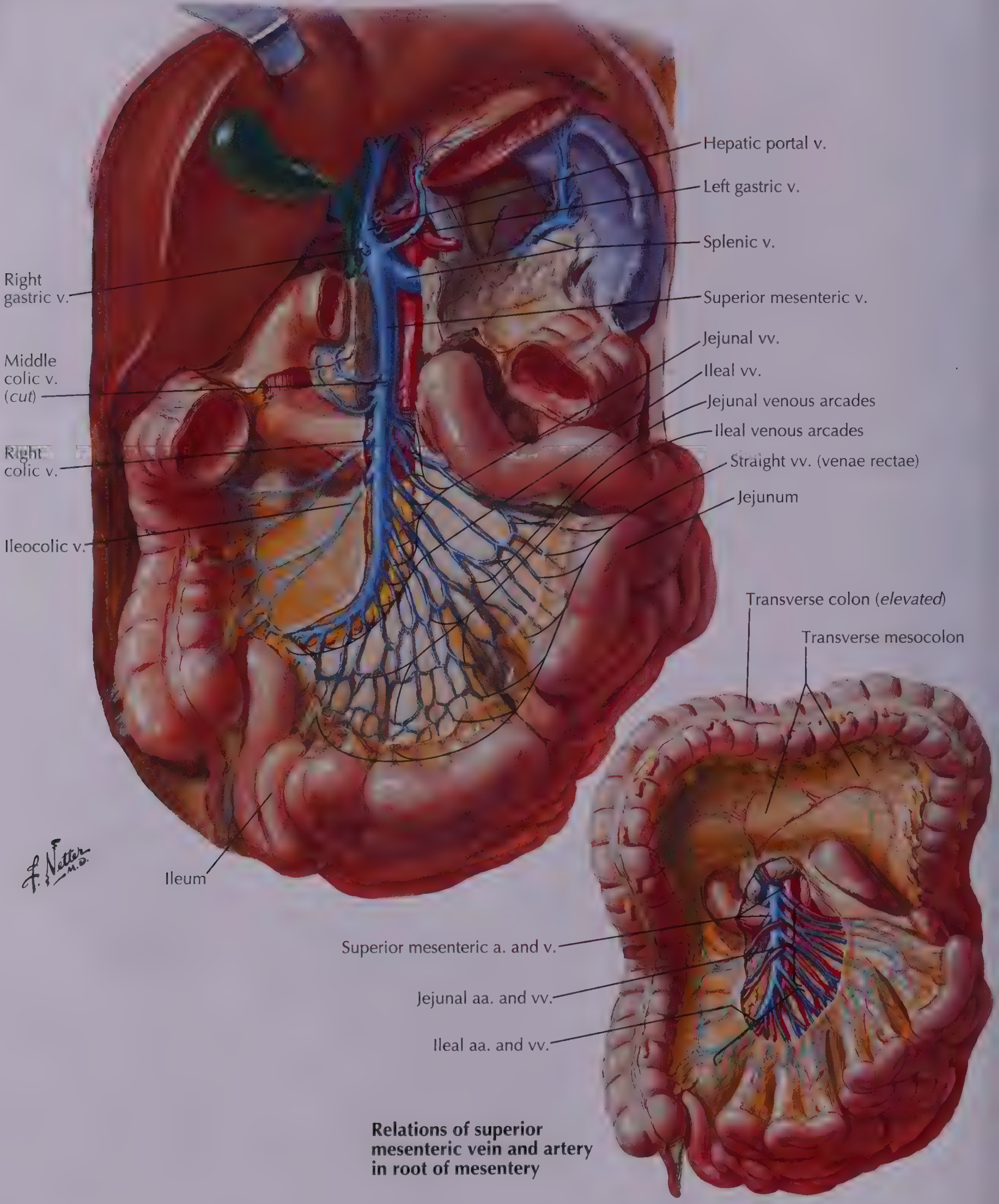
Veins of Stomach, Duodenum, Pancreas, and Spleen

See also Plates BP 66, BP 74, BP 75, BP 78


Hepatic vv.
Inferior vena cava
Esophageal tributary of left gastric v.
Left gastric v.
Short gastric vv.
Hepatic portal v.
Posterior superior pancreaticoduodenal v.
Right gastric v.
Prepyloric v.
Anterior superior pancreaticoduodenal v.
Right gastroomental v.
Left gastroomental v.
Posterior inferior pancreaticoduodenal v.
Anterior inferior pancreaticoduodenal v.
Superior mesenteric v.
Left gastric v.
Splenic v.
Short gastric vv.
Hepatic portal v.
Right gastric v.
Posterior superior pancreaticoduodenal v.
Superior mesenteric v.
Right gastroomental v.
Anterior superior pancreaticoduodenal v.
Left gastroomental v.
Anterior inferior pancreaticoduodenal v.
Pancreatic v.
Inferior mesenteric v.
Posterior inferior pancreaticoduodenal v.

Veins of Small Intestine

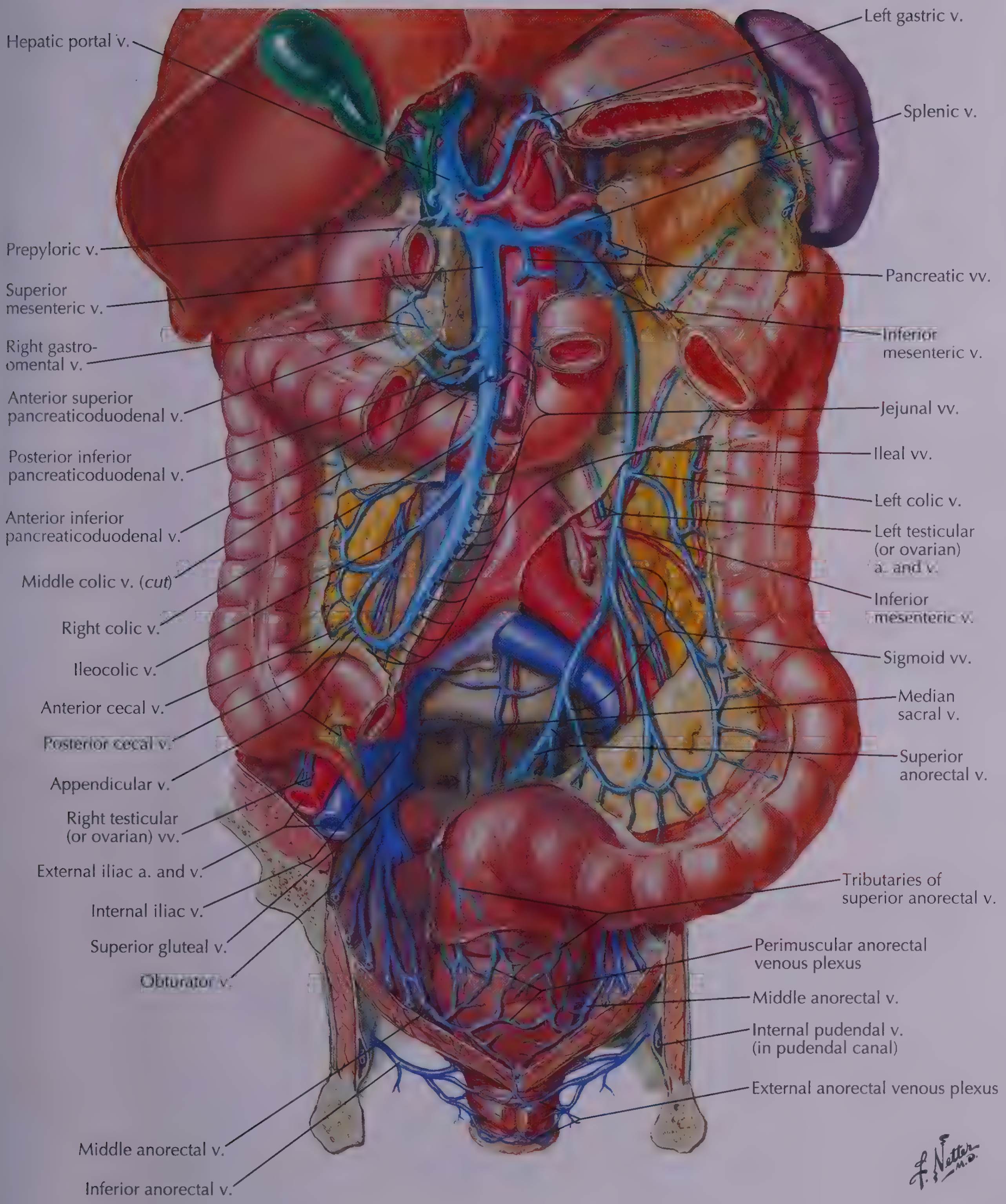
See also Plate BP 76


Hepatic portal v.
Left gastric v.
Splenic v.
Superior mesenteric v.
Jejunal vv.
Ileal vv.
Jejunal venous arcades
Ileal venous arcades
Straight vv. (venae rectae)
Jejunum
Right gastric v.
Middle colic v. (*cut*)
Right colic v.
Ileocolic v.
Ileum
Transverse colon (*elevated*)
Transverse mesocolon
Superior mesenteric a. and v.
Jejunal aa. and vv.
Ileal aa. and vv.

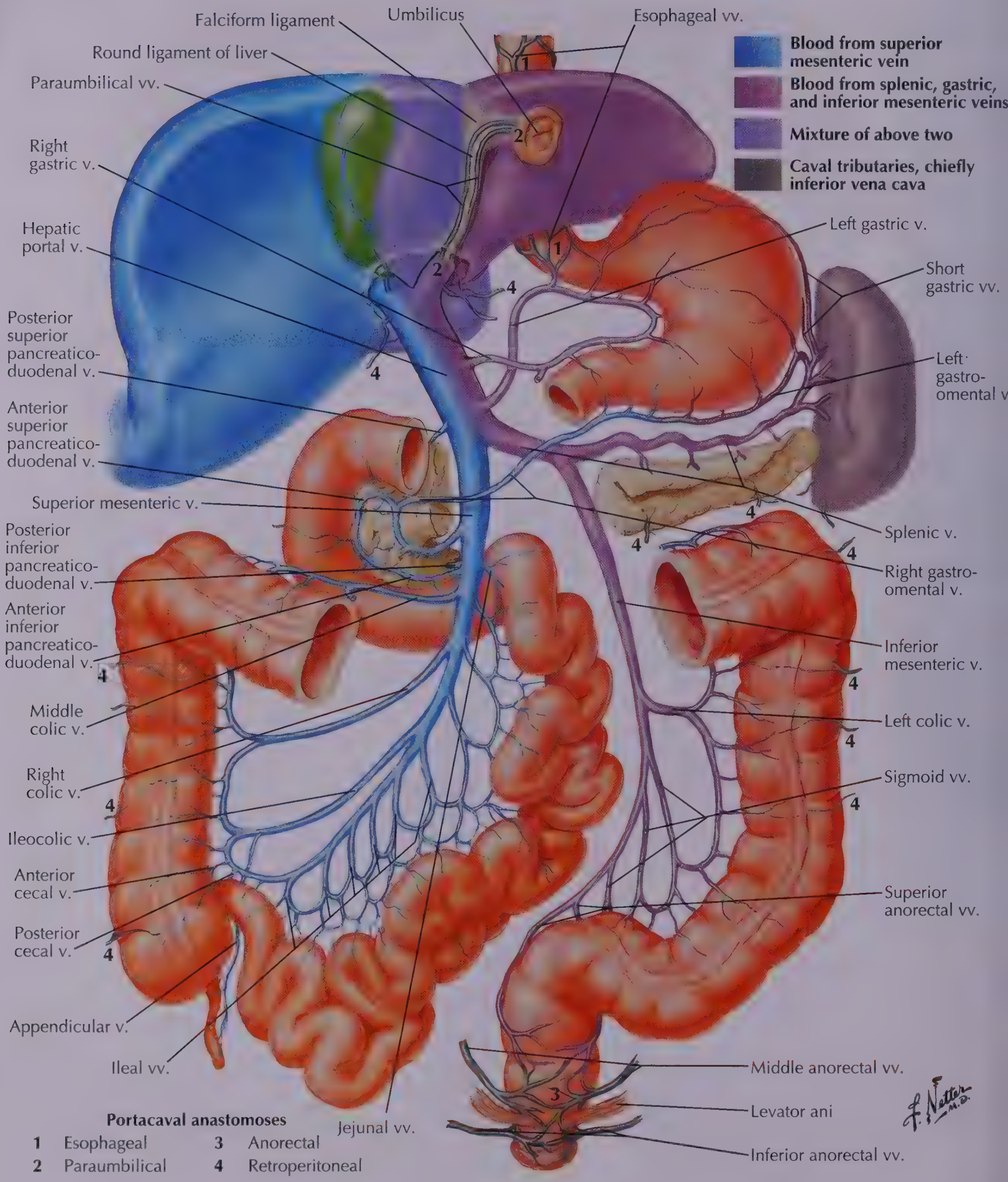
Relations of superior mesenteric vein and artery in root of mesentery

Veins of Large Intestine

See also Plates 401, BP 77

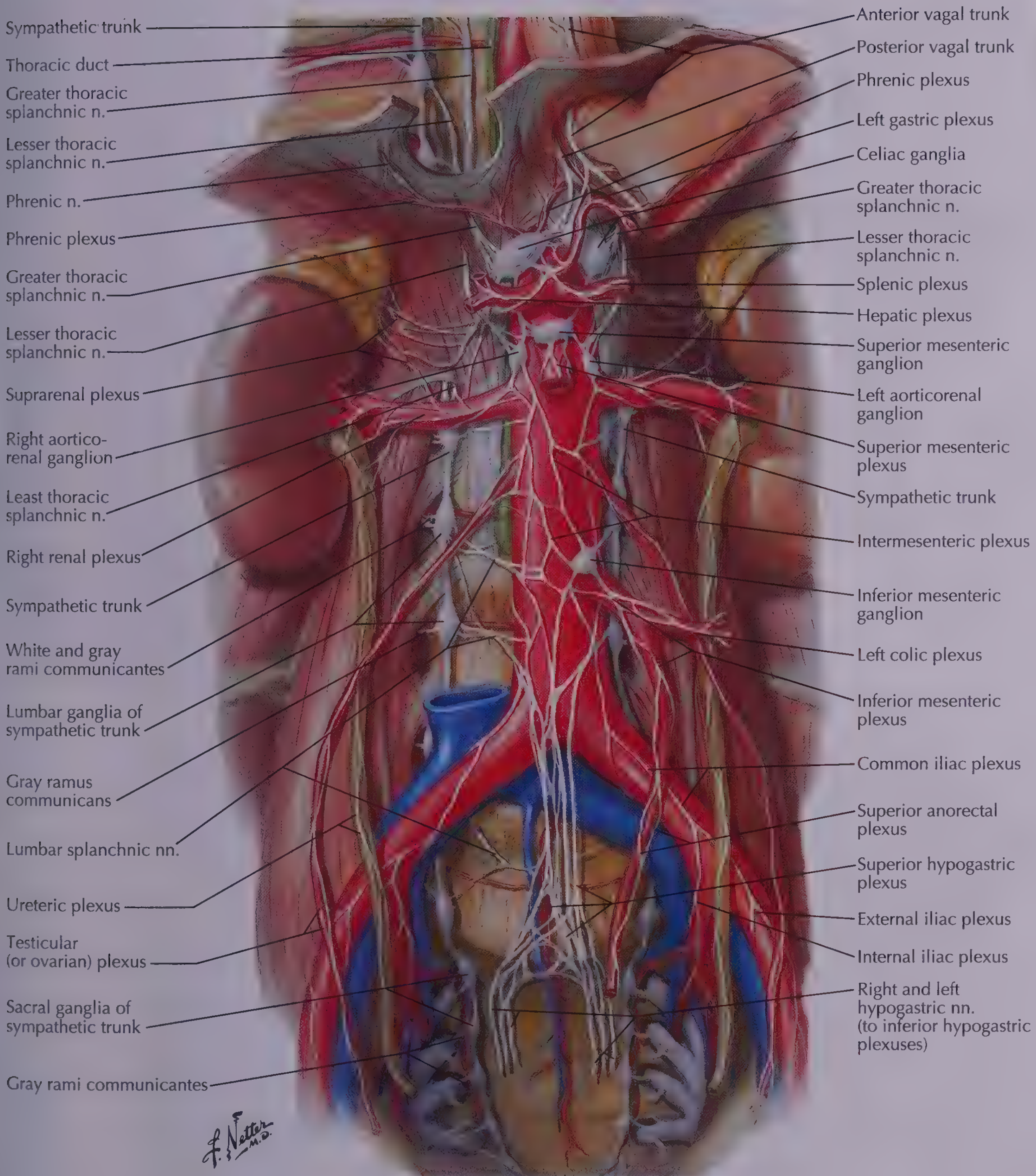

Hepatic portal v.
Prepyloric v.
Superior mesenteric v.
Right gastro-omental v.
Anterior superior pancreaticoduodenal v.
Posterior inferior pancreaticoduodenal v.
Anterior inferior pancreaticoduodenal v.
Middle colic v. (*cut*)
Right colic v.
Ileocolic v.
Anterior cecal v.
Posterior cecal v.
Appendicular v.
Right testicular (or ovarian) vv.
External iliac a. and v.
Internal iliac v.
Superior gluteal v.
Obturator v.
Middle anorectal v.
Inferior anorectal v.
Left gastric v.
Splenic v.
Pancreatic vv.
Inferior mesenteric v.
Jejunal vv.
Ileal vv.
Left colic v.
Left testicular (or ovarian) a. and v.
Inferior mesenteric v.
Sigmoid vv.
Median sacral v.
Superior anorectal v.
Tributaries of superior anorectal v.
Perimuscular anorectal venous plexus
Middle anorectal v.
Internal pudendal v. (in pudendal canal)
External anorectal venous plexus

Hepatic Portal Vein, Tributaries and Portacaval Anastomoses

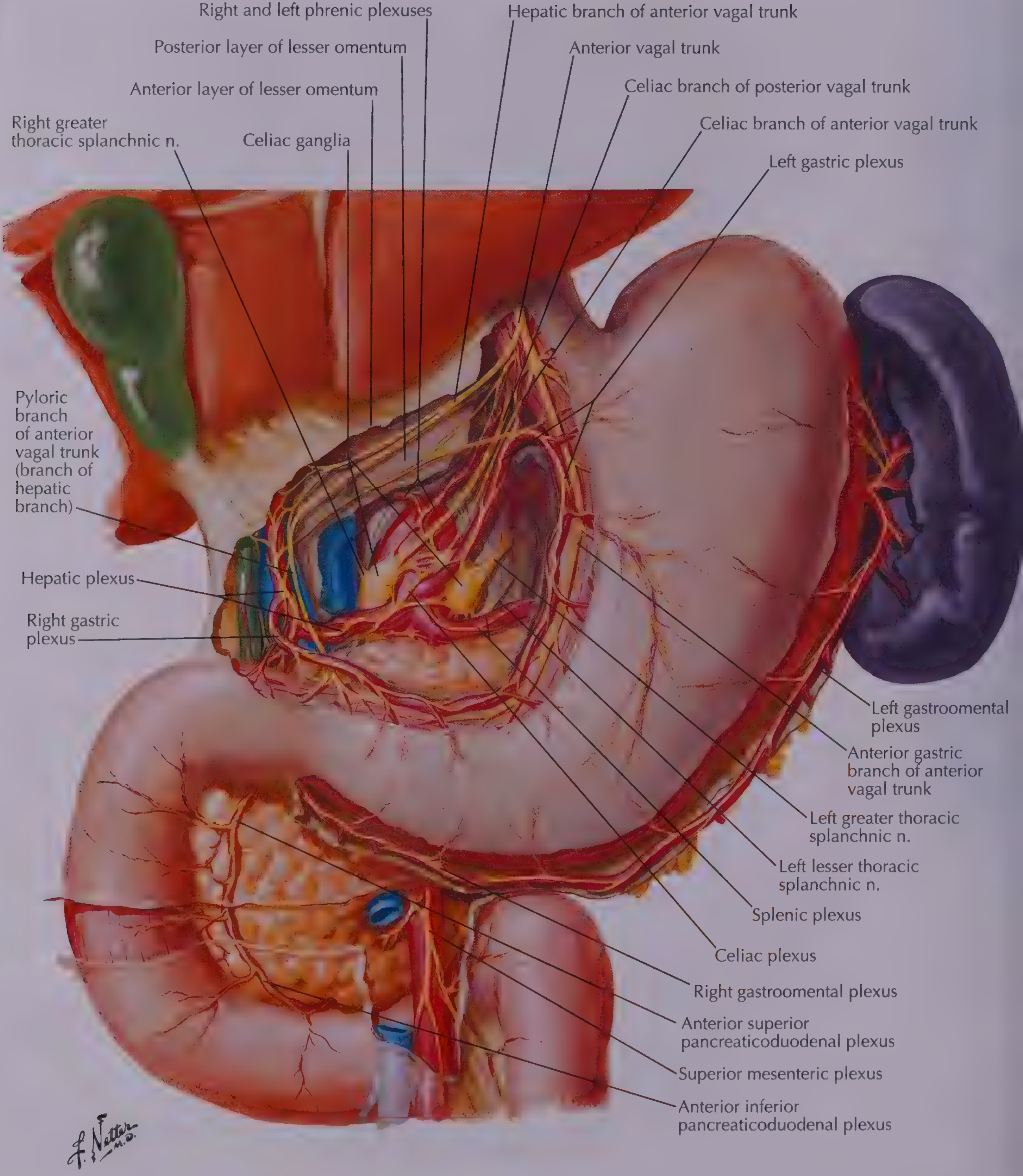

Blood from superior mesenteric vein
Blood from splenic, gastric, and inferior mesenteric veins
Mixture of above two
Caval tributaries, chiefly inferior vena cava
Falciform ligament
Umbilicus
Esophageal vv.
Round ligament of liver
Paraumbilical vv.
Right gastric v.
Hepatic portal v.
Posterior superior pancreaticoduodenal v.
Anterior superior pancreaticoduodenal v.
Superior mesenteric v.
Posterior inferior pancreaticoduodenal v.
Anterior inferior pancreaticoduodenal v.
Middle colic v.
Right colic v.
Ileocolic v.
Anterior cecal v.
Posterior cecal v.
Appendicular v.
Ileal vv.
Jejunal vv.
Left gastric v.
Short gastric vv.
Left gastro-omental v
Splenic v.
Right gastro-omental v.
Inferior mesenteric v.
Left colic v.
Sigmoid vv.
Superior anorectal vv.
Middle anorectal vv.
Levator ani
Inferior anorectal vv.
1
2
3
4
Portacaval anastomoses
1 Esophageal
2 Paraumbilical
3 Anorectal
4 Retroperitoneal
F. Netter M.D.

Autonomic Nerves and Ganglia of Abdomen

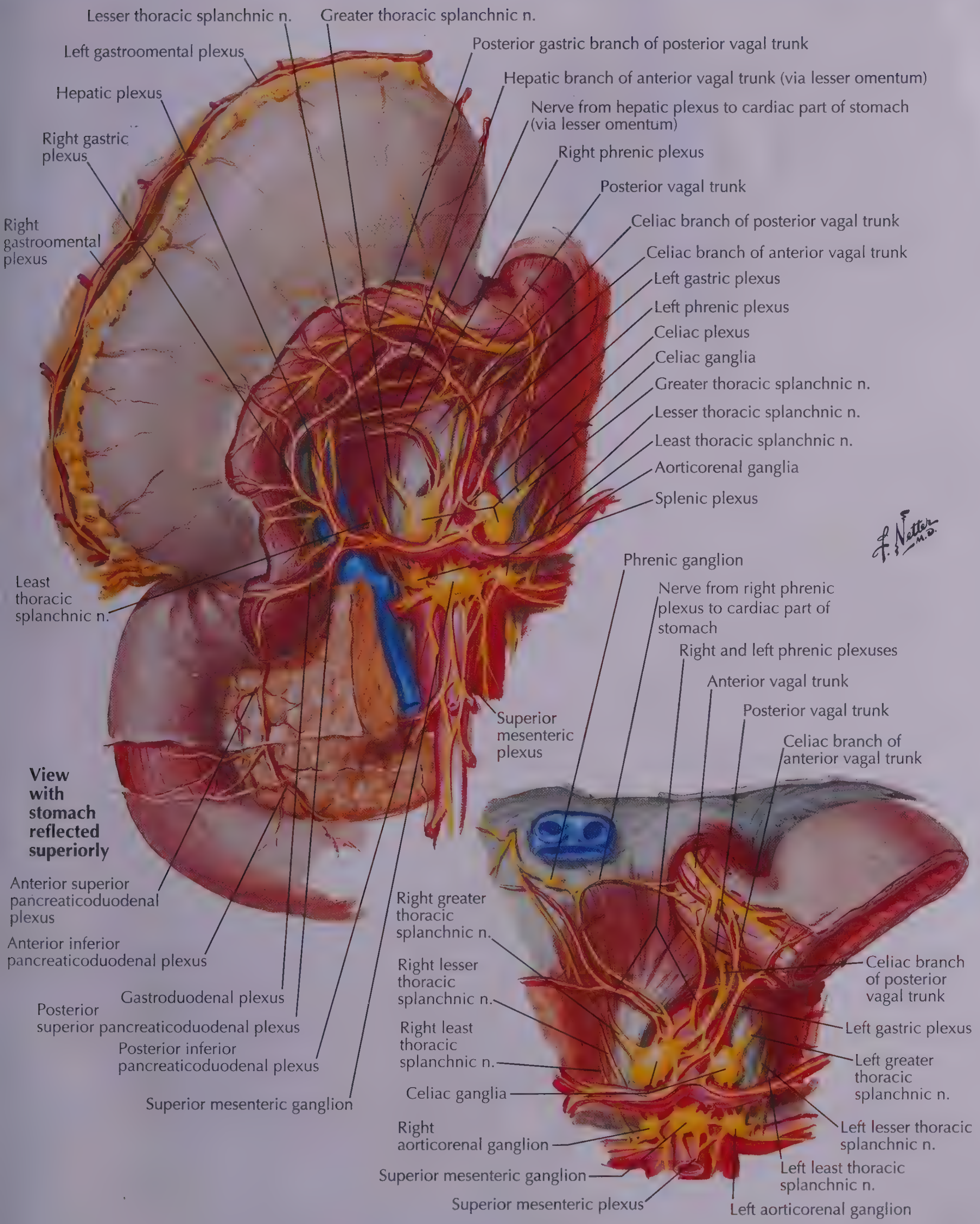
See also Plate 323


Sympathetic trunk
Thoracic duct
Greater thoracic splanchnic n.
Lesser thoracic splanchnic n.
Phrenic n.
Phrenic plexus
Greater thoracic splanchnic n.
Lesser thoracic splanchnic n.
Suprarenal plexus
Right aortico-renal ganglion
Least thoracic splanchnic n.
Right renal plexus
Sympathetic trunk
White and gray rami communicantes
Lumbar ganglia of sympathetic trunk
Gray ramus communicans
Lumbar splanchnic nn.
Ureteric plexus
Testicular (or ovarian) plexus
Sacral ganglia of sympathetic trunk
Gray rami communicantes
Anterior vagal trunk
Posterior vagal trunk
Phrenic plexus
Left gastric plexus
Celiac ganglia
Greater thoracic splanchnic n.
Lesser thoracic splanchnic n.
Splenic plexus
Hepatic plexus
Superior mesenteric ganglion
Left aorticorenal ganglion
Superior mesenteric plexus
Sympathetic trunk
Intermesenteric plexus
Inferior mesenteric ganglion
Left colic plexus
Inferior mesenteric plexus
Common iliac plexus
Superior anorectal plexus
Superior hypogastric plexus
External iliac plexus
Internal iliac plexus
Right and left hypogastric nn. (to inferior hypogastric plexuses)

See also Plate 261

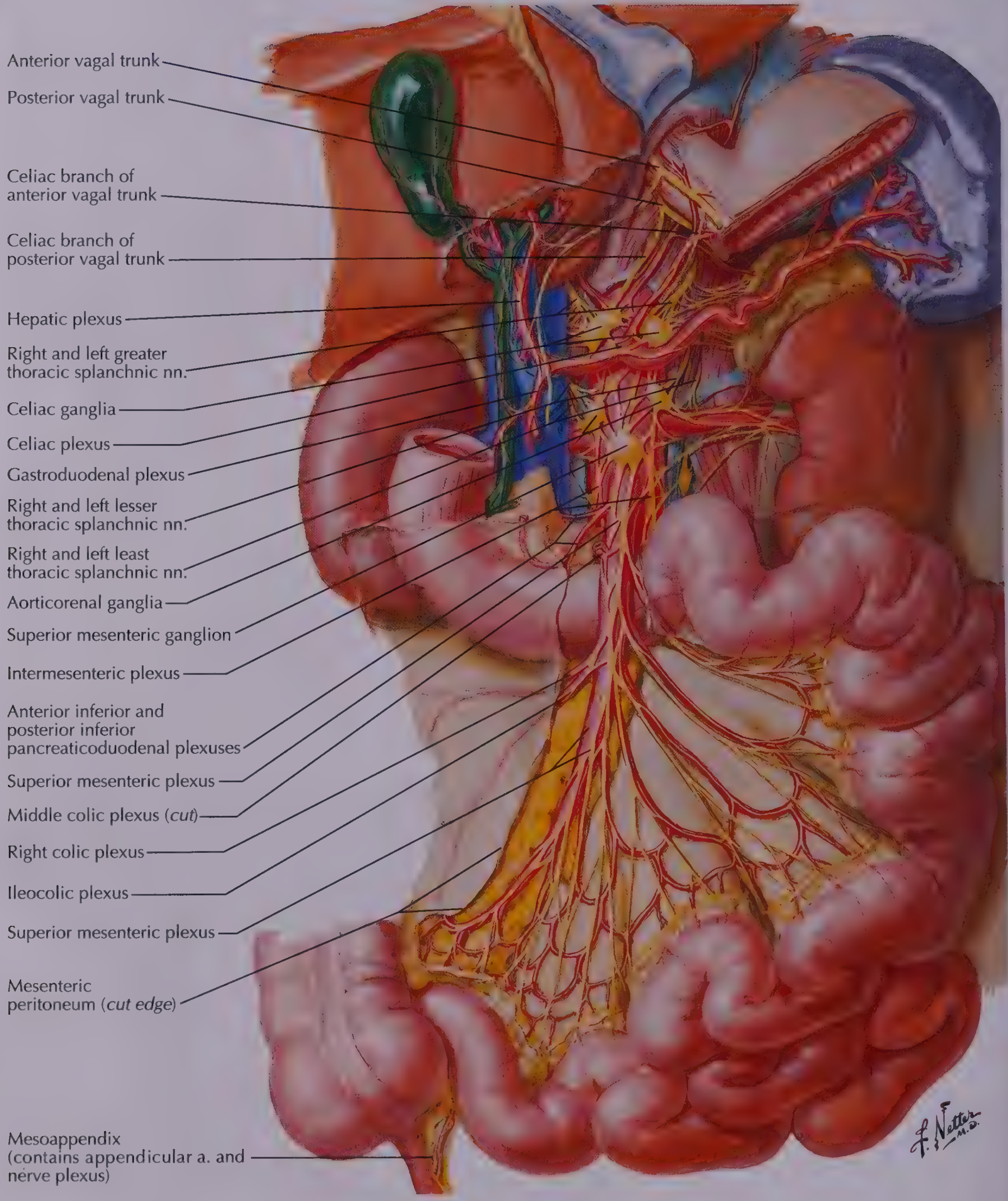

Right and left phrenic plexuses
Posterior layer of lesser omentum
Anterior layer of lesser omentum
Right greater thoracic splanchnic n.
Celiac ganglia
Hepatic branch of anterior vagal trunk
Anterior vagal trunk
Celiac branch of posterior vagal trunk
Celiac branch of anterior vagal trunk
Left gastric plexus
Pyloric branch of anterior vagal trunk (branch of hepatic branch)
Hepatic plexus
Right gastric plexus
Left gastroomental plexus
Anterior gastric branch of anterior vagal trunk
Left greater thoracic splanchnic n.
Left lesser thoracic splanchnic n.
Splenic plexus
Celiac plexus
Right gastroomental plexus
Anterior superior pancreaticoduodenal plexus
Superior mesenteric plexus
Anterior inferior pancreaticoduodenal plexus
F. Netter M.D.

Autonomic Innervation of Stomach and Duodenum (Continued)

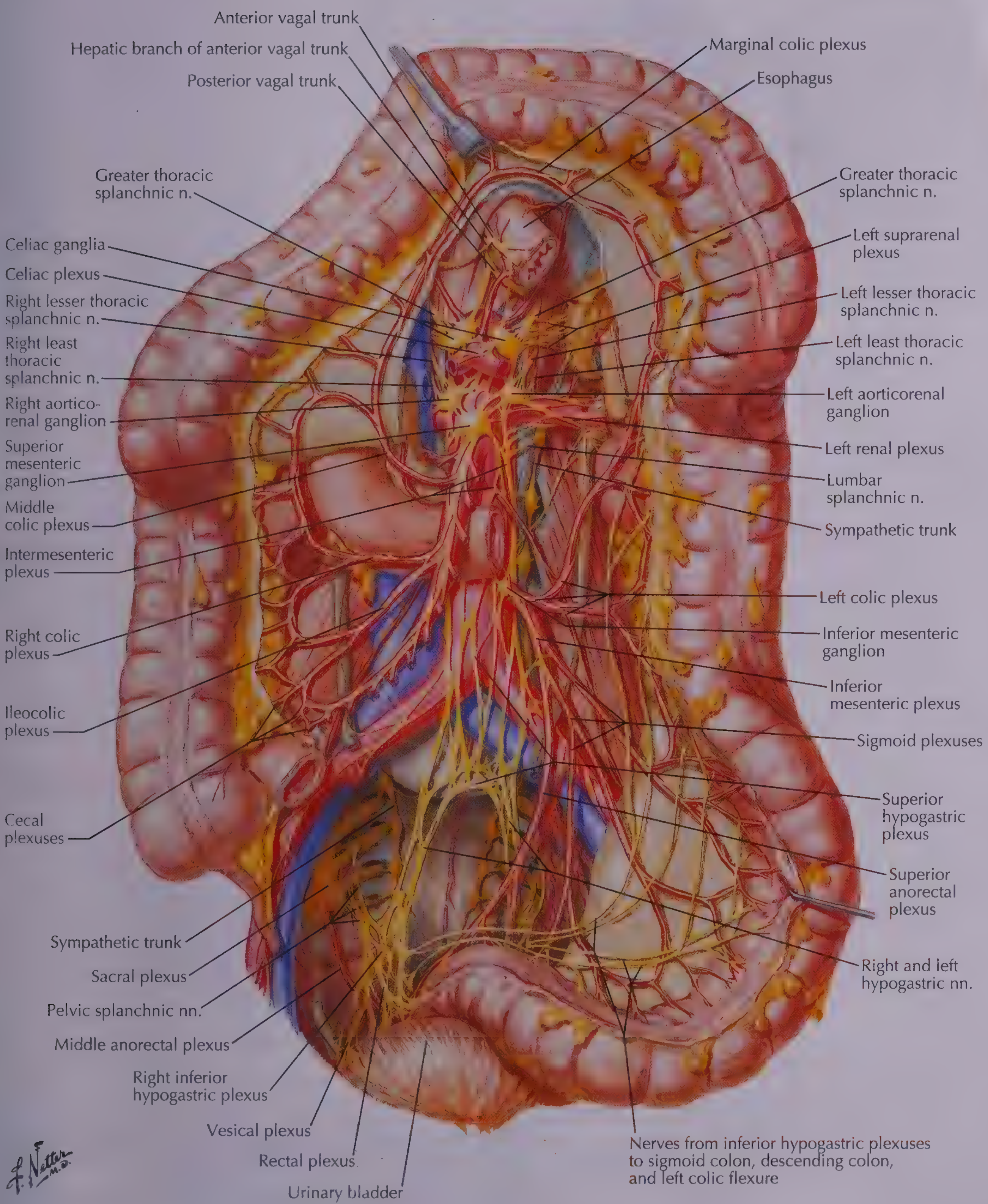

Lesser thoracic splanchnic n.
Greater thoracic splanchnic n.
Left gastroomental plexus
Posterior gastric branch of posterior vagal trunk
Hepatic branch of anterior vagal trunk (via lesser omentum)
Hepatic plexus
Nerve from hepatic plexus to cardiac part of stomach (via lesser omentum)
Right gastric plexus
Right phrenic plexus
Posterior vagal trunk
Right gastroomental plexus
Celiac branch of posterior vagal trunk
Celiac branch of anterior vagal trunk
Left gastric plexus
Left phrenic plexus
Celiac plexus
Celiac ganglia
Greater thoracic splanchnic n.
Lesser thoracic splanchnic n.
Least thoracic splanchnic n.
Aorticorenal ganglia
Splenic plexus
F. Netter M.D.
Least thoracic splanchnic n.
Phrenic ganglion
Nerve from right phrenic plexus to cardiac part of stomach
Right and left phrenic plexuses
Anterior vagal trunk
Posterior vagal trunk
Superior mesenteric plexus
Celiac branch of anterior vagal trunk
Anterior superior pancreaticoduodenal plexus
Anterior inferior pancreaticoduodenal plexus
Gastroduodenal plexus
Posterior superior pancreaticoduodenal plexus
Posterior inferior pancreaticoduodenal plexus
Superior mesenteric ganglion
Right greater thoracic splanchnic n.
Right lesser thoracic splanchnic n.
Right least thoracic splanchnic n.
Celiac ganglia
Right aorticorenal ganglion
Superior mesenteric ganglion
Superior mesenteric plexus
Celiac branch of posterior vagal trunk
Left gastric plexus
Left greater thoracic splanchnic n.
Left lesser thoracic splanchnic n.
Left least thoracic splanchnic n.
Left aorticorenal ganglion

View with stomach reflected superiorly

Autonomic Innervation of Small Intestine

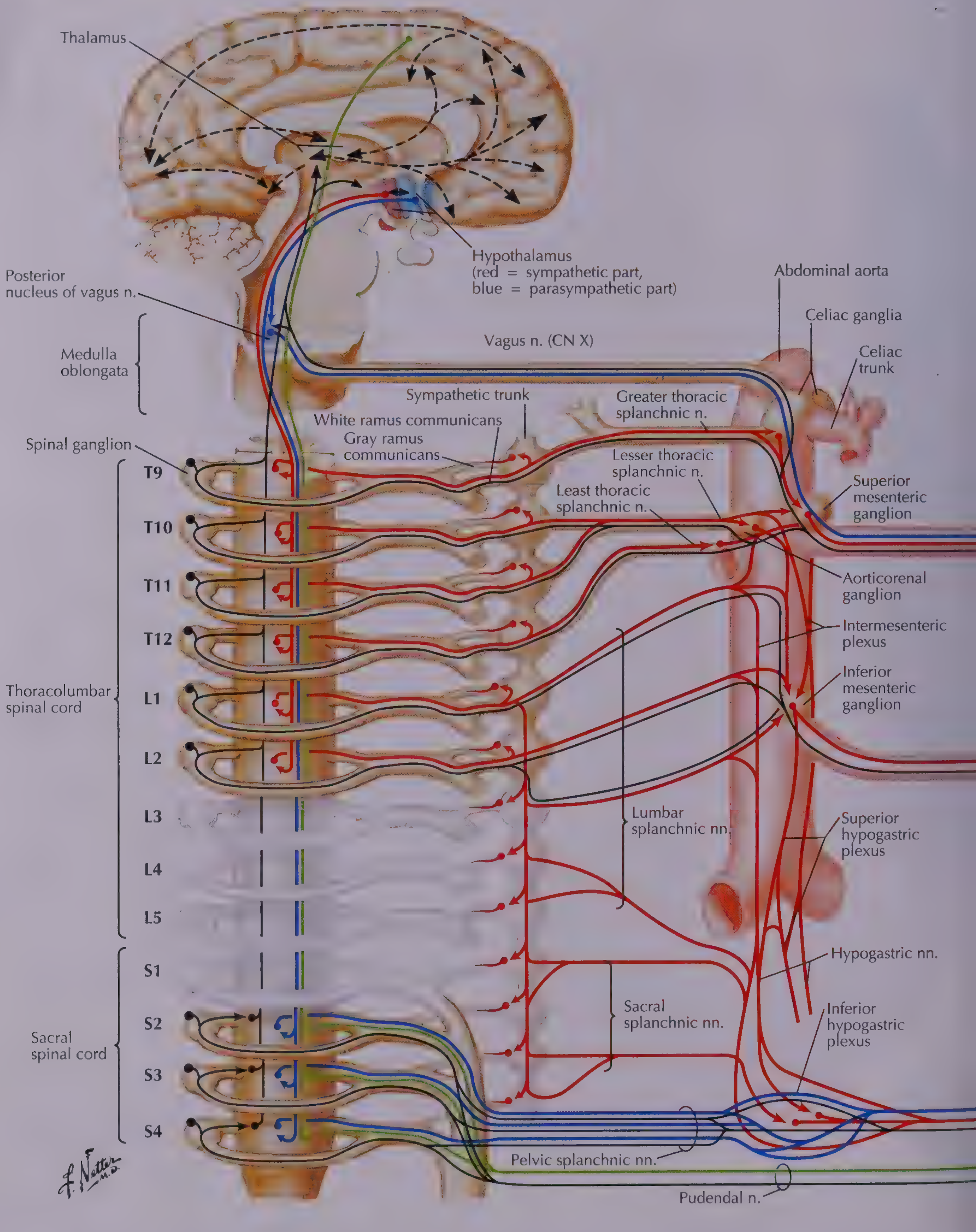

Anterior vagal trunk
Posterior vagal trunk
Celiac branch of anterior vagal trunk
Celiac branch of posterior vagal trunk
Hepatic plexus
Right and left greater thoracic splanchnic nn.
Celiac ganglia
Celiac plexus
Gastroduodenal plexus
Right and left lesser thoracic splanchnic nn.
Right and left least thoracic splanchnic nn.
Aorticorenal ganglia
Superior mesenteric ganglion
Intermesenteric plexus
Anterior inferior and posterior inferior pancreaticoduodenal plexuses
Superior mesenteric plexus
Middle colic plexus (cut)
Right colic plexus
Ileocolic plexus
Superior mesenteric plexus
Mesenteric peritoneum (cut edge)
Mesoappendix (contains appendicular a. and nerve plexus)

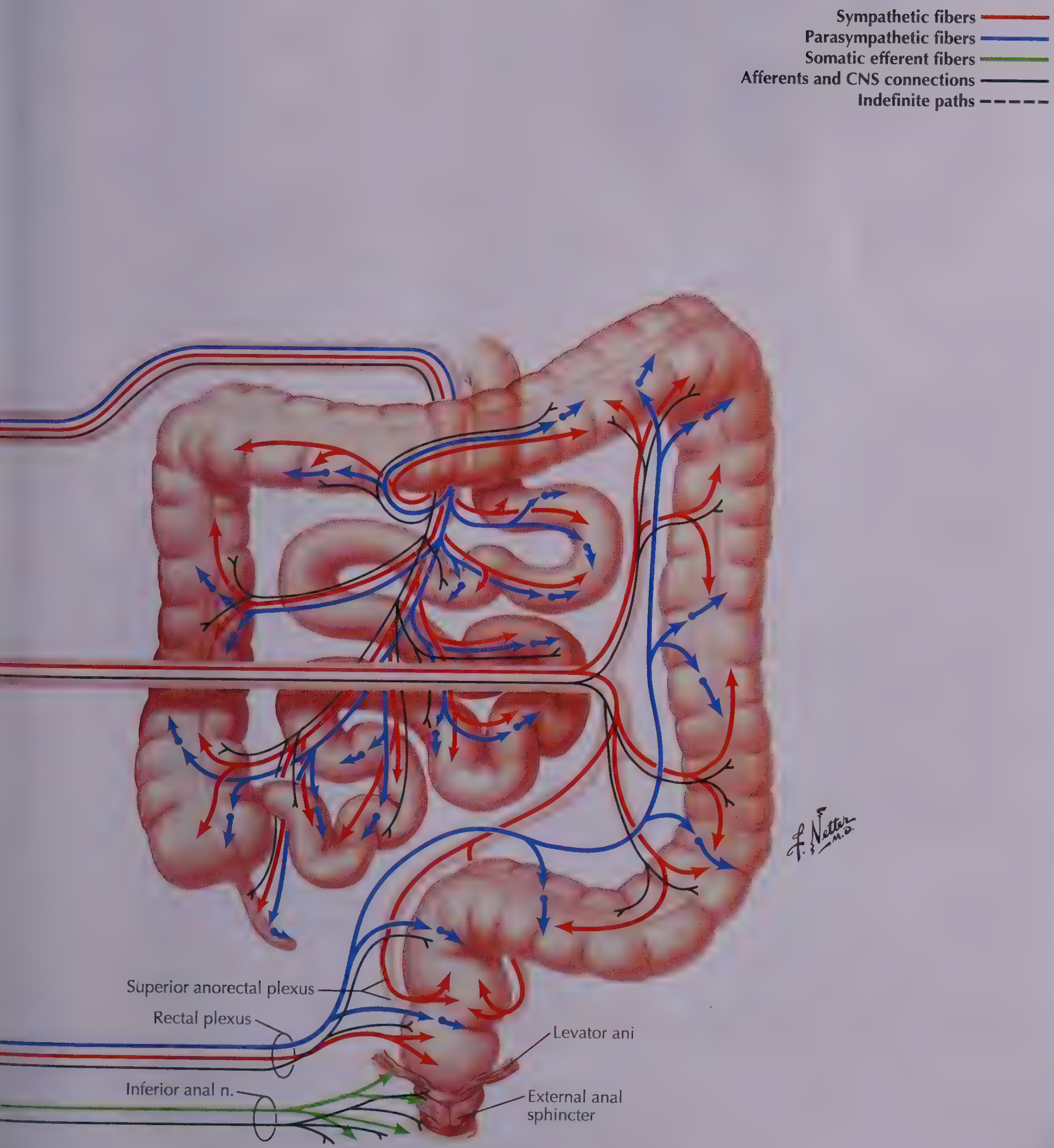
See also Plates 412, 413, 414


Anterior vagal trunk
Hepatic branch of anterior vagal trunk
Posterior vagal trunk
Marginal colic plexus
Esophagus
Greater thoracic splanchnic n.
Celiac ganglia
Celiac plexus
Right lesser thoracic splanchnic n.
Right least thoracic splanchnic n.
Right aorticorenal ganglion
Superior mesenteric ganglion
Middle colic plexus
Intermesenteric plexus
Right colic plexus
Ileocolic plexus
Cecal plexuses
Sympathetic trunk
Sacral plexus
Pelvic splanchnic nn.
Middle anorectal plexus
Right inferior hypogastric plexus
Vesical plexus
Rectal plexus
Urinary bladder
Greater thoracic splanchnic n.
Left suprarenal plexus
Left lesser thoracic splanchnic n.
Left least thoracic splanchnic n.
Left aorticorenal ganglion
Left renal plexus
Lumbar splanchnic n.
Sympathetic trunk
Left colic plexus
Inferior mesenteric ganglion
Inferior mesenteric plexus
Sigmoid plexuses
Superior hypogastric plexus
Superior anorectal plexus
Right and left hypogastric nn.
Nerves from inferior hypogastric plexuses to sigmoid colon, descending colon, and left colic flexure

Autonomic Innervation of Intestine: Schema

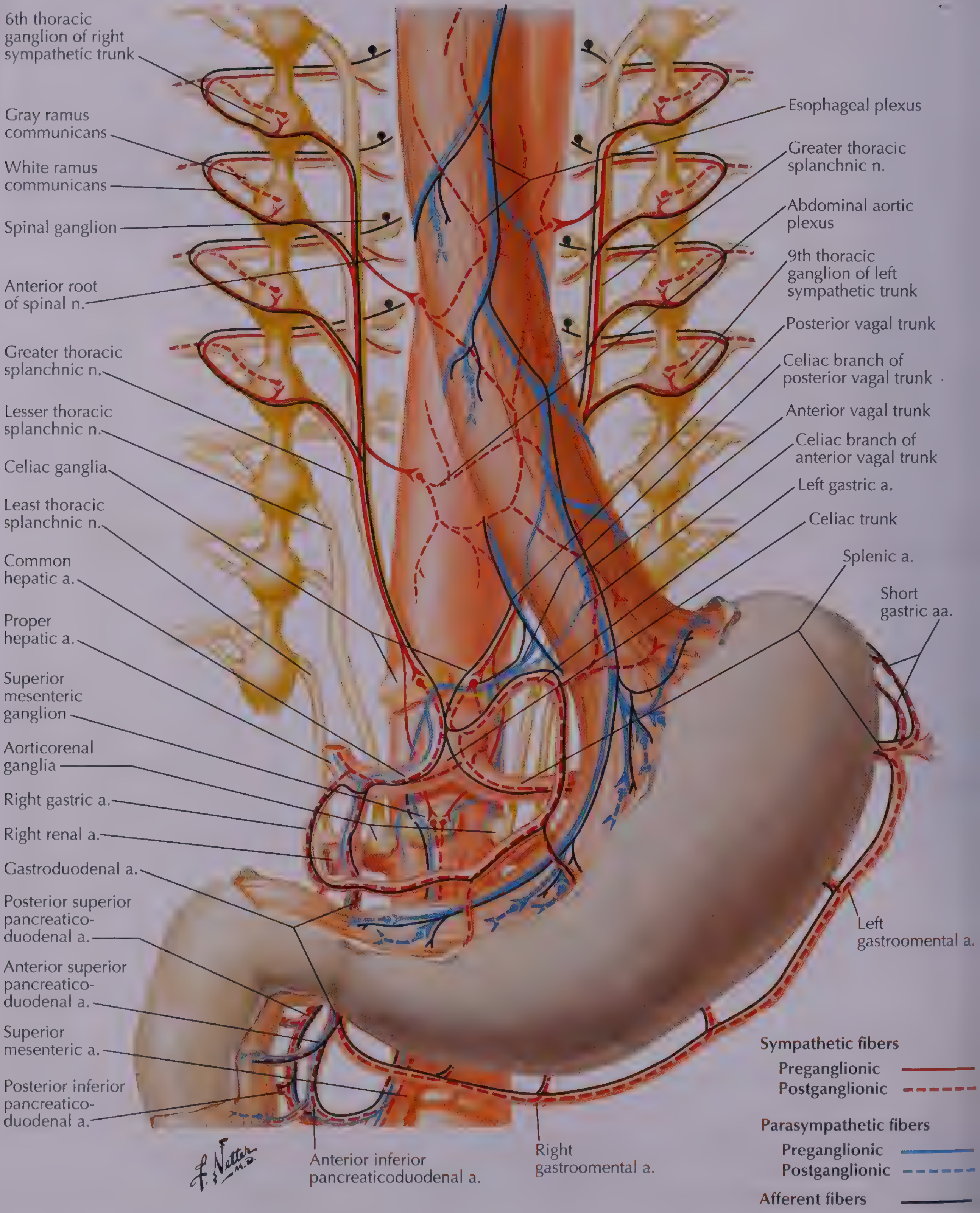
See also Plates 6, 7


Thalamus
Hypothalamus
(red = sympathetic part,
blue = parasympathetic part)
Posterior
nucleus of vagus n.
Medulla
oblongata
Vagus n. (CN X)
Abdominal aorta
Celiac ganglia
Celiac
trunk
Sympathetic trunk
White ramus communicans
Gray ramus
communicans
Greater thoracic
splanchnic n.
Spinal ganglion
Lesser thoracic
splanchnic n.
Least thoracic
splanchnic n.
Superior
mesenteric
ganglion
T9
T10
T11
T12
L1
L2
L3
L4
L5
S1
S2
S3
S4
Thoracolumbar
spinal cord
Aorticorenal
ganglion
Intermesenteric
plexus
Inferior
mesenteric
ganglion
Lumbar
splanchnic nn.
Superior
hypogastric
plexus
Hypogastric nn.
Sacral
splanchnic nn.
Sacral
spinal cord
Inferior
hypogastric
plexus
Pelvic splanchnic nn.
Pudendal n.
F. Netter M.D.

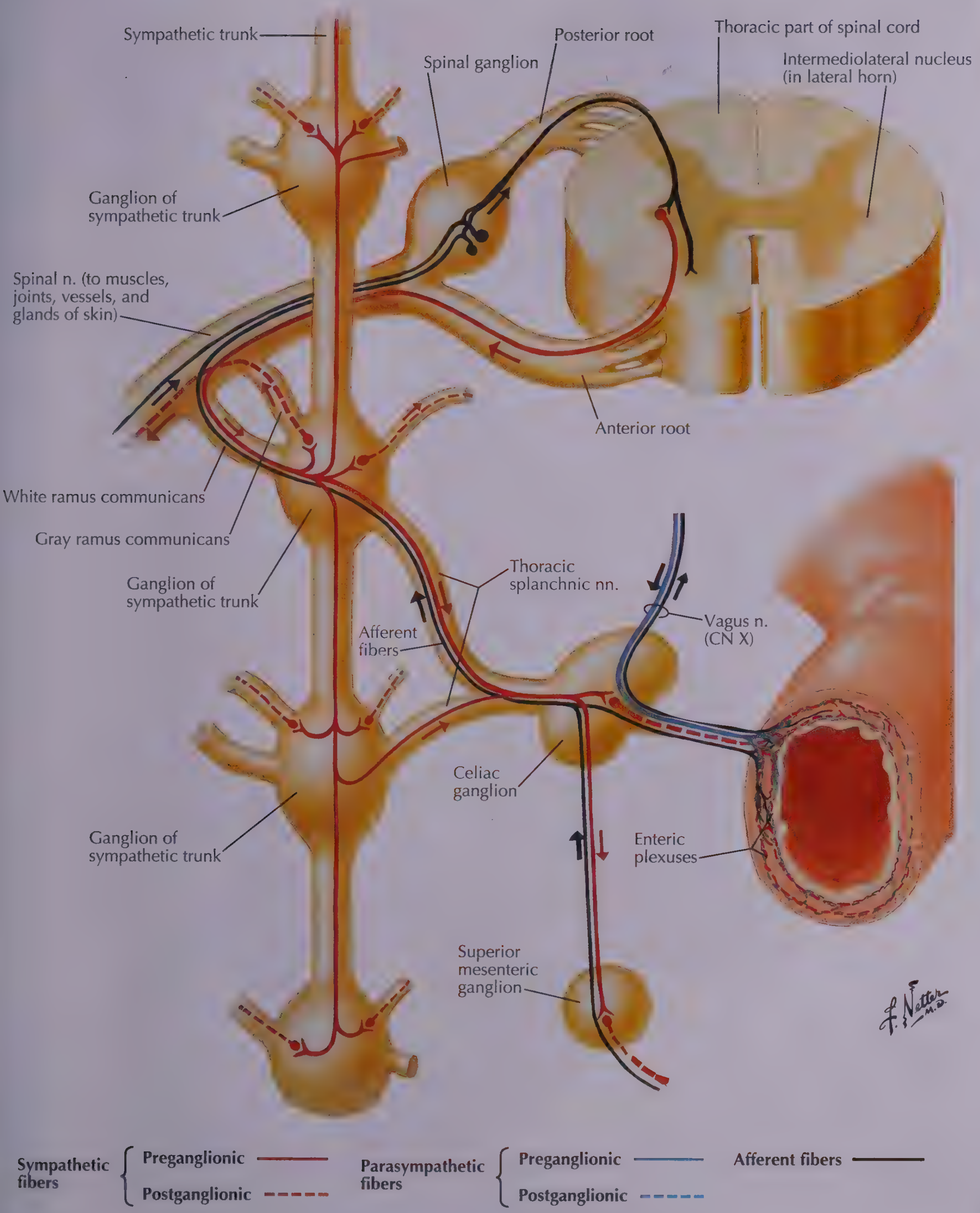

Sympathetic fibers
Parasympathetic fibers
Somatic efferent fibers
Afferents and CNS connections
Indefinite paths
Superior anorectal plexus
Rectal plexus
Inferior anal n.
Levator ani
External anal sphincter

Autonomic Innervation of Esophagus, Stomach, and Duodenum: Schema

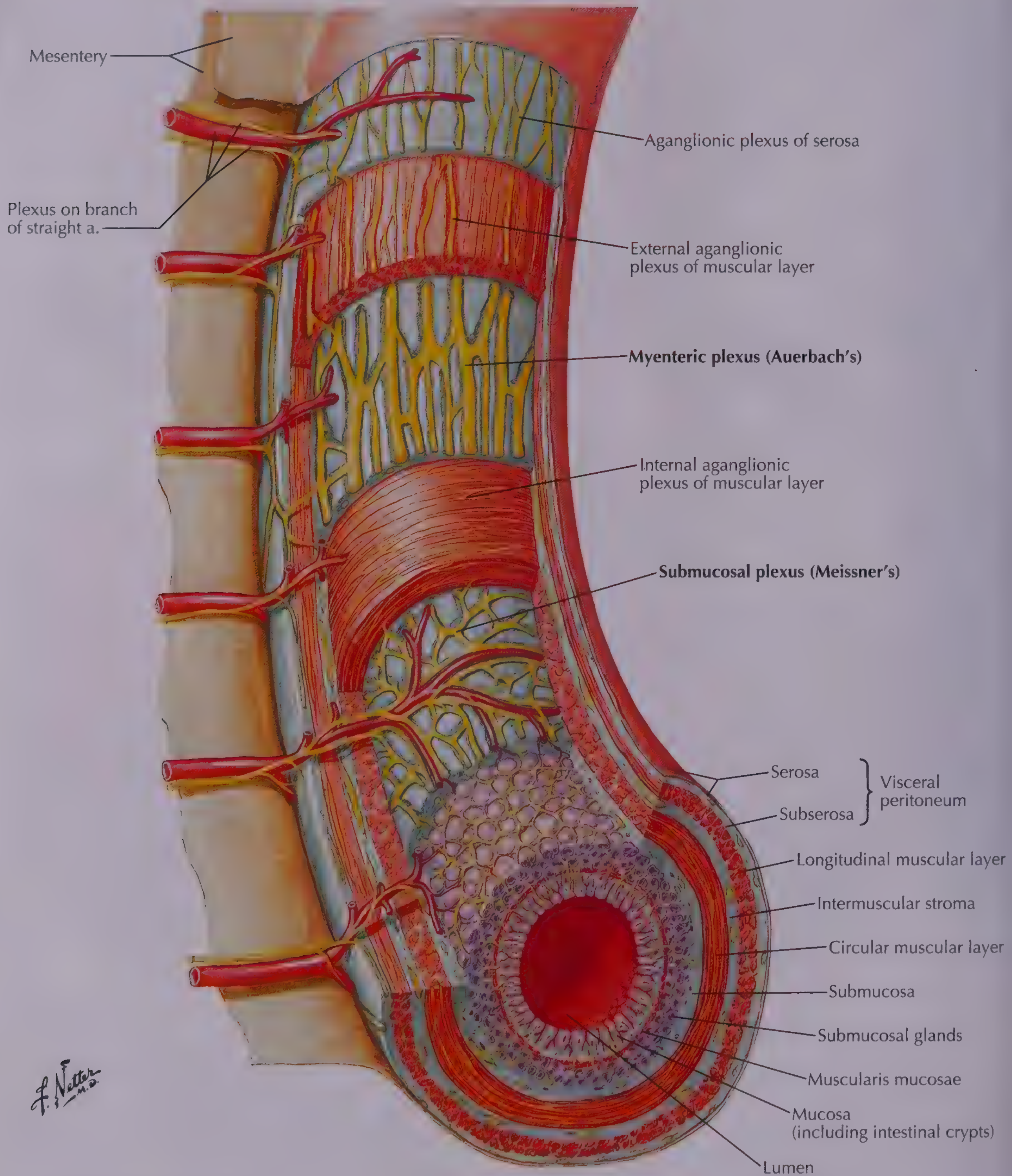
See also Plates 6, 7


6th thoracic ganglion of right sympathetic trunk
Gray ramus communicans
White ramus communicans
Spinal ganglion
Anterior root of spinal n.
Greater thoracic splanchnic n.
Lesser thoracic splanchnic n.
Celiac ganglia
Least thoracic splanchnic n.
Common hepatic a.
Proper hepatic a.
Superior mesenteric ganglion
Aorticorenal ganglia
Right gastric a.
Right renal a.
Gastroduodenal a.
Posterior superior pancreaticoduodenal a.
Anterior superior pancreaticoduodenal a.
Superior mesenteric a.
Posterior inferior pancreaticoduodenal a.
Anterior inferior pancreaticoduodenal a.
Right gastroomental a.
Esophageal plexus
Greater thoracic splanchnic n.
Abdominal aortic plexus
9th thoracic ganglion of left sympathetic trunk
Posterior vagal trunk
Celiac branch of posterior vagal trunk
Anterior vagal trunk
Celiac branch of anterior vagal trunk
Left gastric a.
Celiac trunk
Splenic a.
Short gastric aa.
Left gastroomental a.
Sympathetic fibers
Preganglionic
Postganglionic
Parasympathetic fibers
Preganglionic
Postganglionic
Afferent fibers
F. Netter M.D.

Autonomic Reflex Pathways: Schema


Sympathetic trunk
Posterior root
Thoracic part of spinal cord
Spinal ganglion
Intermediolateral nucleus (in lateral horn)
Ganglion of sympathetic trunk
Spinal n. (to muscles, joints, vessels, and glands of skin)
Anterior root
White ramus communicans
Gray ramus communicans
Ganglion of sympathetic trunk
Thoracic splanchnic nn.
Vagus n. (CN X)
Afferent fibers
Celiac ganglion
Ganglion of sympathetic trunk
Enteric plexuses
Superior mesenteric ganglion
Sympathetic fibers
Preganglionic
Postganglionic
Parasympathetic fibers
Preganglionic
Postganglionic
Afferent fibers

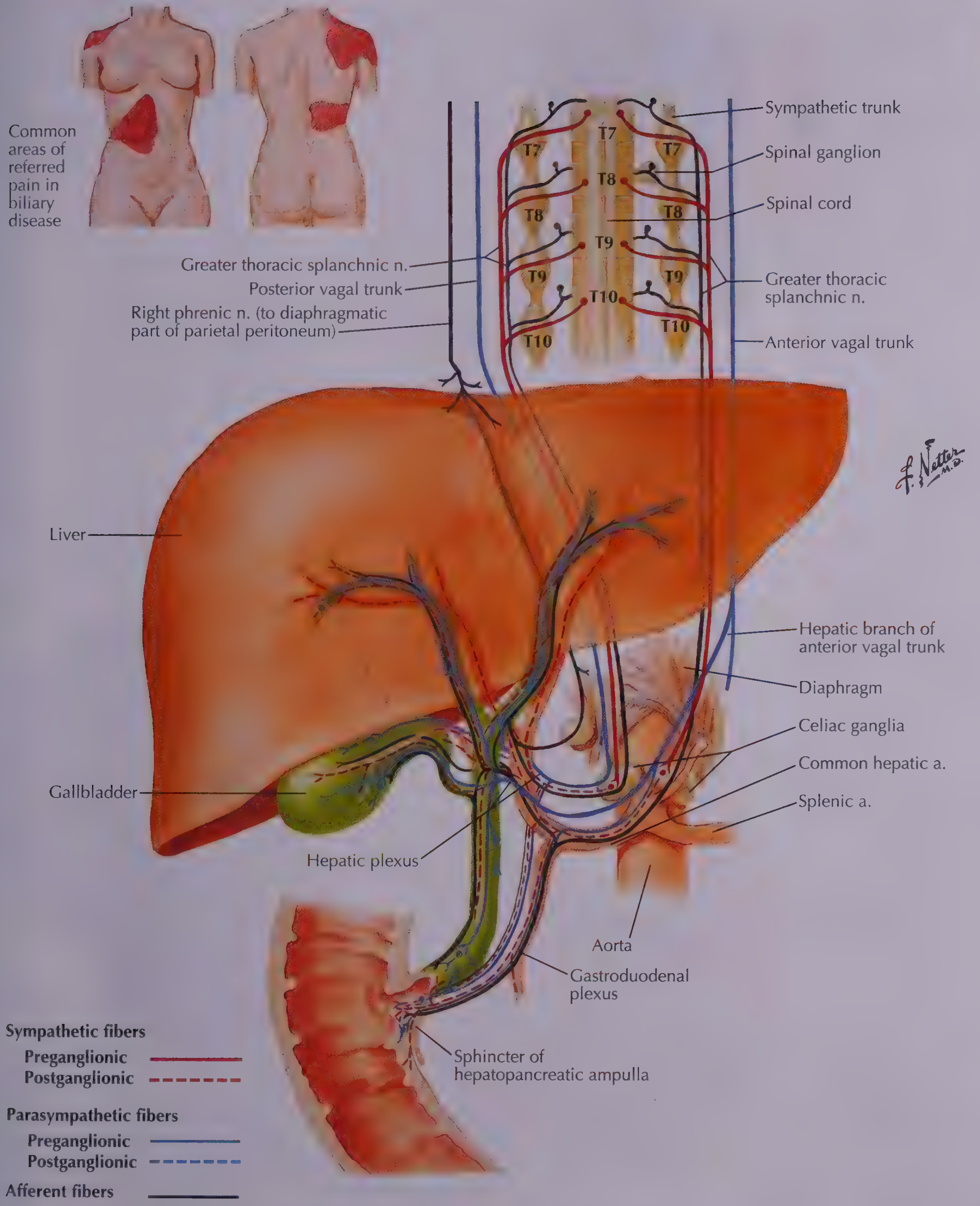
See also **Plate BP 48**


Mesentery
Plexus on branch of straight a.
Aganglionic plexus of serosa
External aganglionic plexus of muscular layer
Myenteric plexus (Auerbach's)
Internal aganglionic plexus of muscular layer
Submucosal plexus (Meissner's)
Serosa
Subserosa
Visceral peritoneum
Longitudinal muscular layer
Intermuscular stroma
Circular muscular layer
Submucosa
Submucosal glands
Muscularis mucosae
Mucosa (including intestinal crypts)
Lumen
F. Netter M.D.

Note: Intestinal wall is shown much thicker than in actuality.

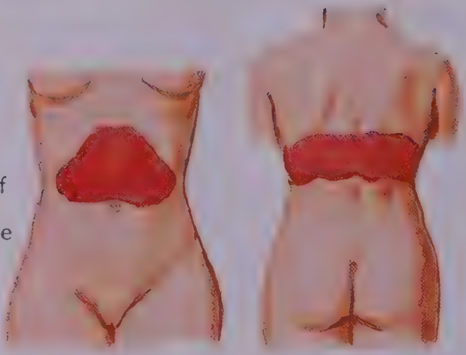
Autonomic Innervation of Liver: Schema

See also Plates 6, 7

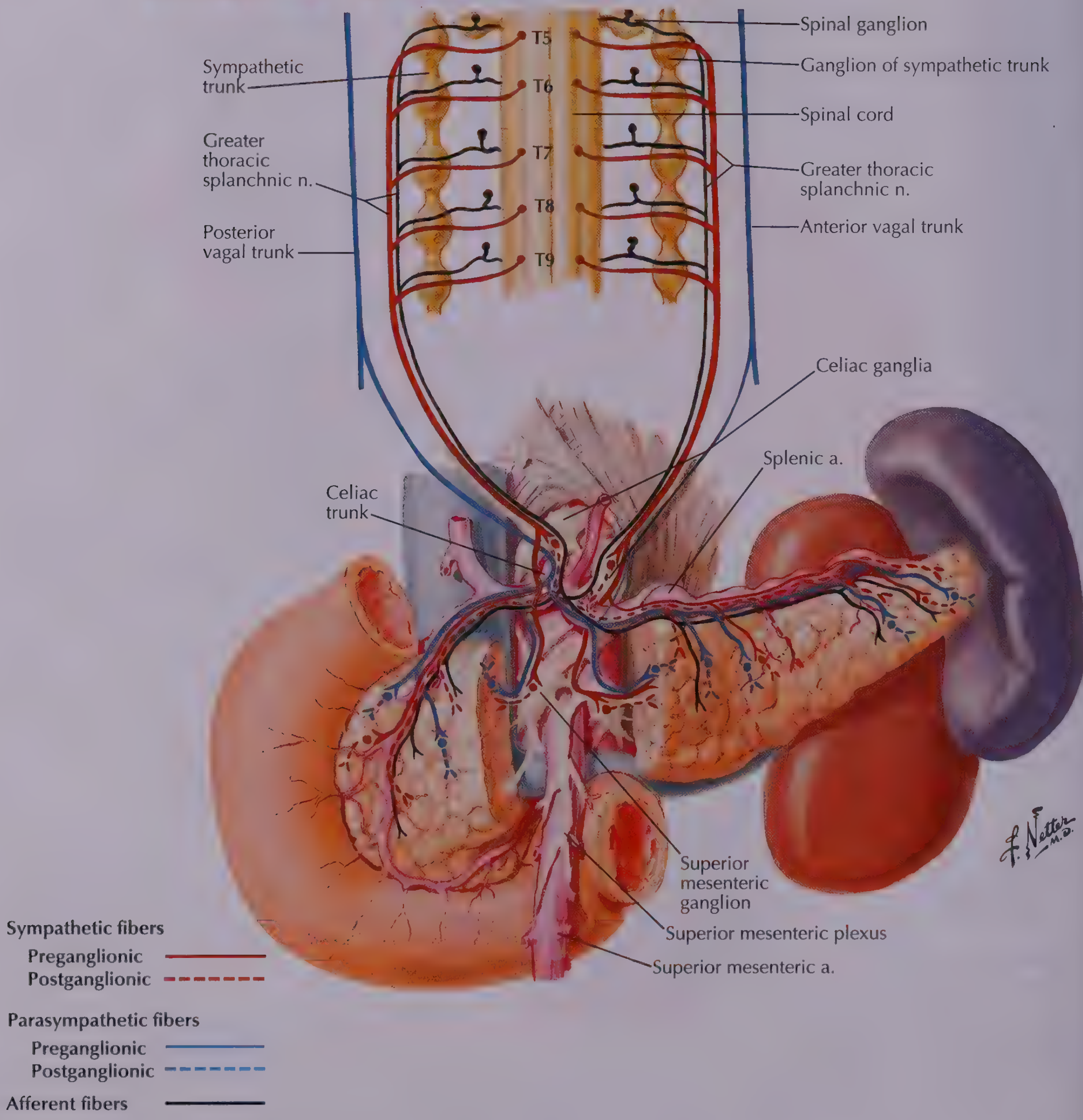

Common areas of referred pain in biliary disease
Sympathetic trunk
Spinal ganglion
Spinal cord
T7
T7
T7
T8
T8
T8
T9
T9
T9
T10
T10
T10
Greater thoracic splanchnic n.
Posterior vagal trunk
Right phrenic n. (to diaphragmatic part of parietal peritoneum)
Greater thoracic splanchnic n.
Anterior vagal trunk
F. Netter M.D.
Liver
Hepatic branch of anterior vagal trunk
Diaphragm
Celiac ganglia
Common hepatic a.
Splenic a.
Gallbladder
Hepatic plexus
Aorta
Gastroduodenal plexus
Sphincter of hepatopancreatic ampulla
Sympathetic fibers
Preganglionic
Postganglionic
Parasympathetic fibers
Preganglionic
Postganglionic
Afferent fibers

Autonomic Innervation of Pancreas: Schema

See also Plates 6, 7

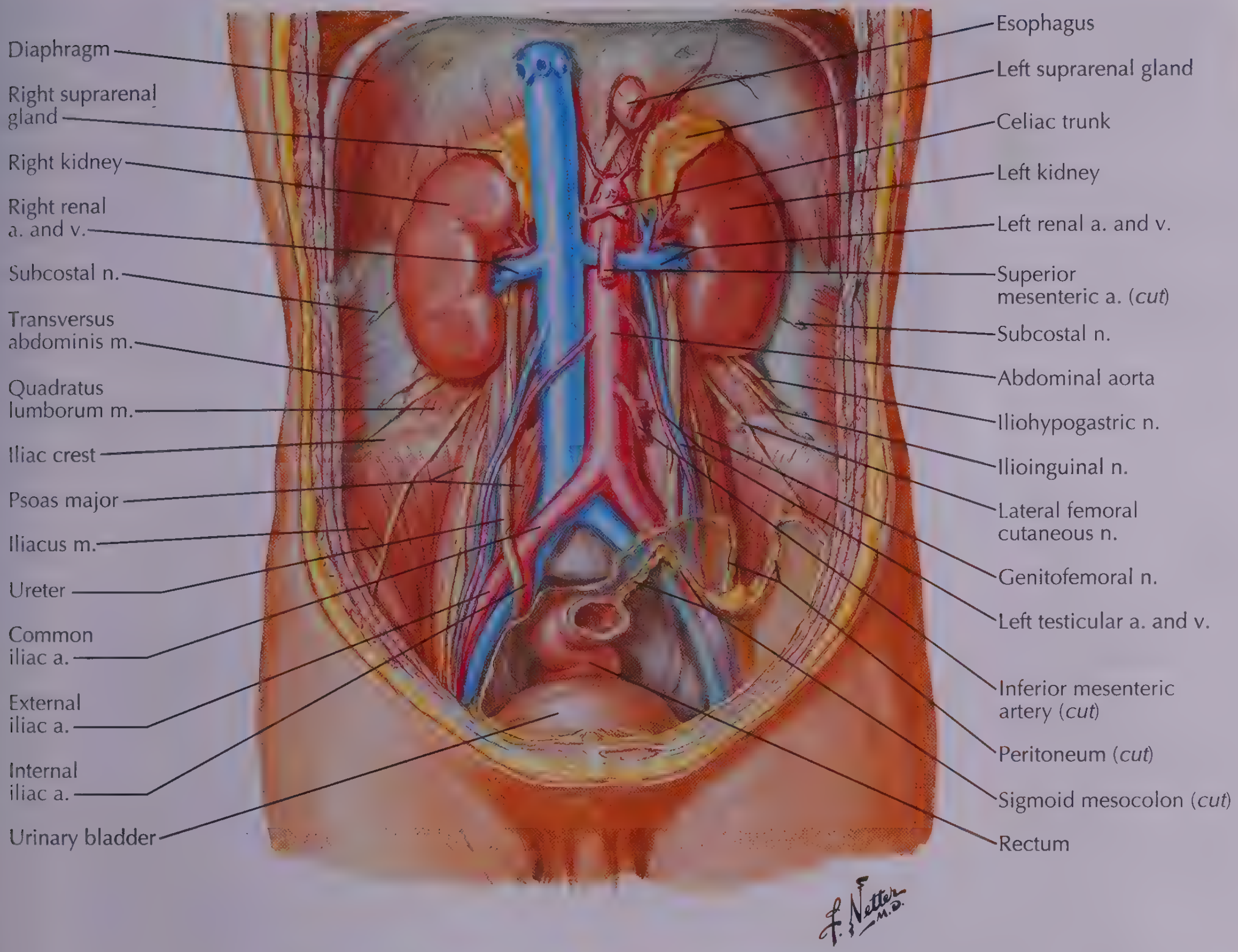


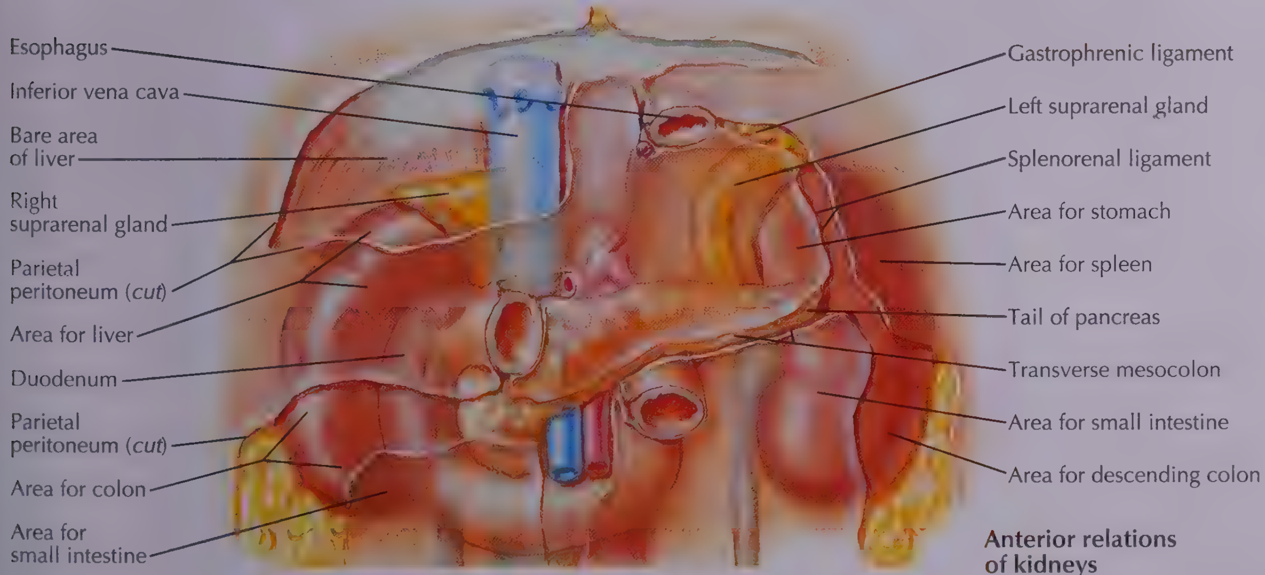
Common areas of referred pain in pancreatic disease



Spinal ganglion
Ganglion of sympathetic trunk
Sympathetic trunk
Spinal cord
Greater thoracic splanchnic n.
Greater thoracic splanchnic n.
T5
T6
T7
T8
T9
Posterior vagal trunk
Anterior vagal trunk
Celiac ganglia
Splenic a.
Celiac trunk
Superior mesenteric ganglion
Superior mesenteric plexus
Superior mesenteric a.
F. Netter M.D.
Sympathetic fibers
Preganglionic
Postganglionic
Parasympathetic fibers
Preganglionic
Postganglionic
Afferent fibers

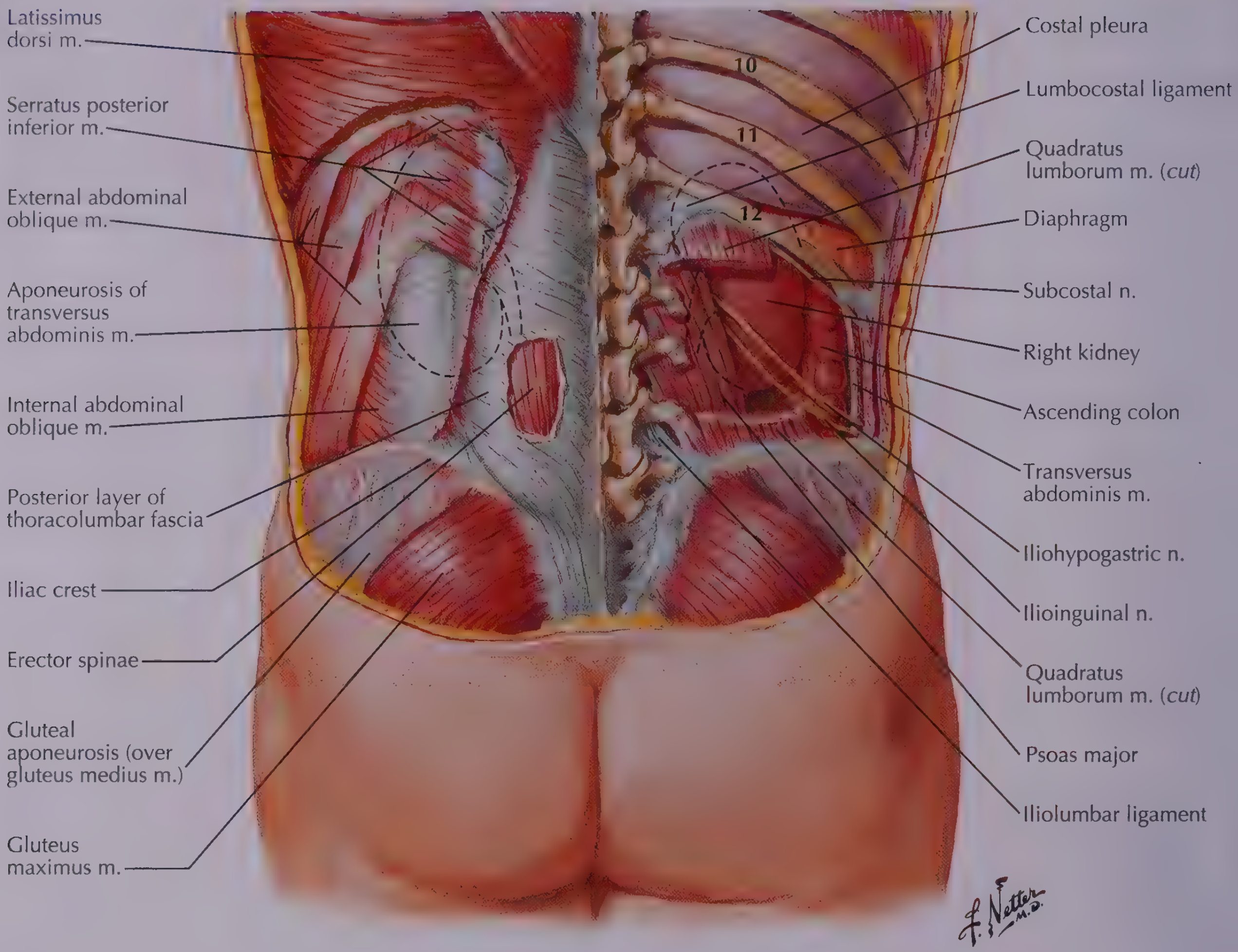
Kidneys in Situ: Anterior Views

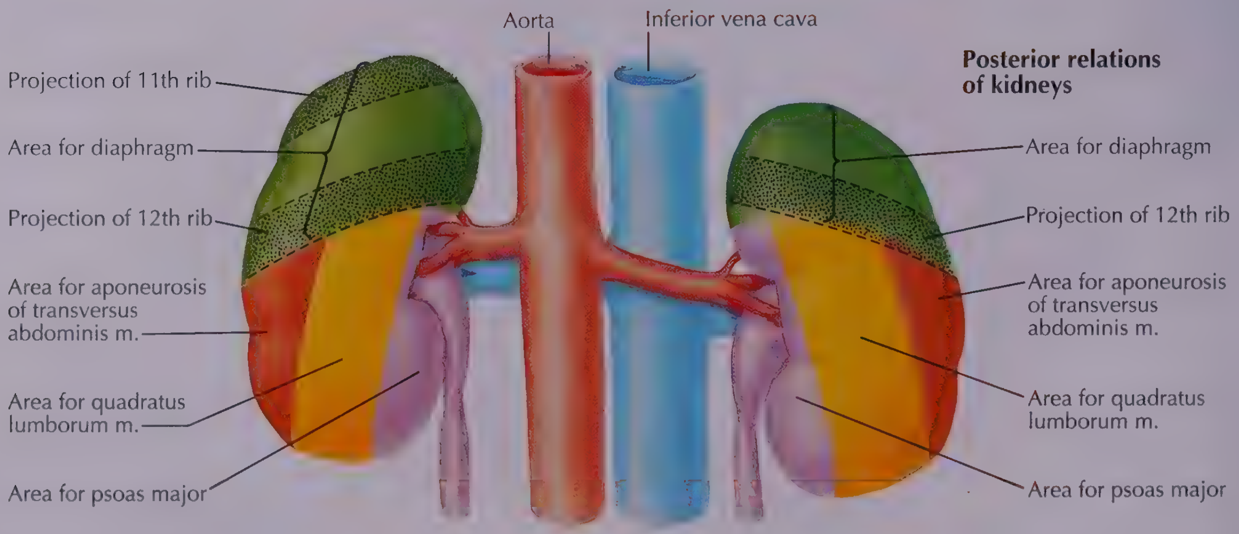

Diaphragm
Right suprarenal gland
Right kidney
Right renal a. and v.
Subcostal n.
Transversus abdominis m.
Quadratus lumborum m.
Iliac crest
Psoas major
Iliacus m.
Ureter
Common iliac a.
External iliac a.
Internal iliac a.
Urinary bladder
Esophagus
Left suprarenal gland
Celiac trunk
Left kidney
Left renal a. and v.
Superior mesenteric a. (cut)
Subcostal n.
Abdominal aorta
Iliohypogastric n.
Ilioinguinal n.
Lateral femoral cutaneous n.
Genitofemoral n.
Left testicular a. and v.
Inferior mesenteric artery (cut)
Peritoneum (cut)
Sigmoid mesocolon (cut)
Rectum
F. Netter M.D.


Esophagus
Inferior vena cava
Bare area of liver
Right suprarenal gland
Parietal peritoneum (cut)
Area for liver
Duodenum
Parietal peritoneum (cut)
Area for colon
Area for small intestine
Gastrophrenic ligament
Left suprarenal gland
Splenorenal ligament
Area for stomach
Area for spleen
Tail of pancreas
Transverse mesocolon
Area for small intestine
Area for descending colon

Anterior relations of kidneys

Kidneys in Situ: Posterior Views

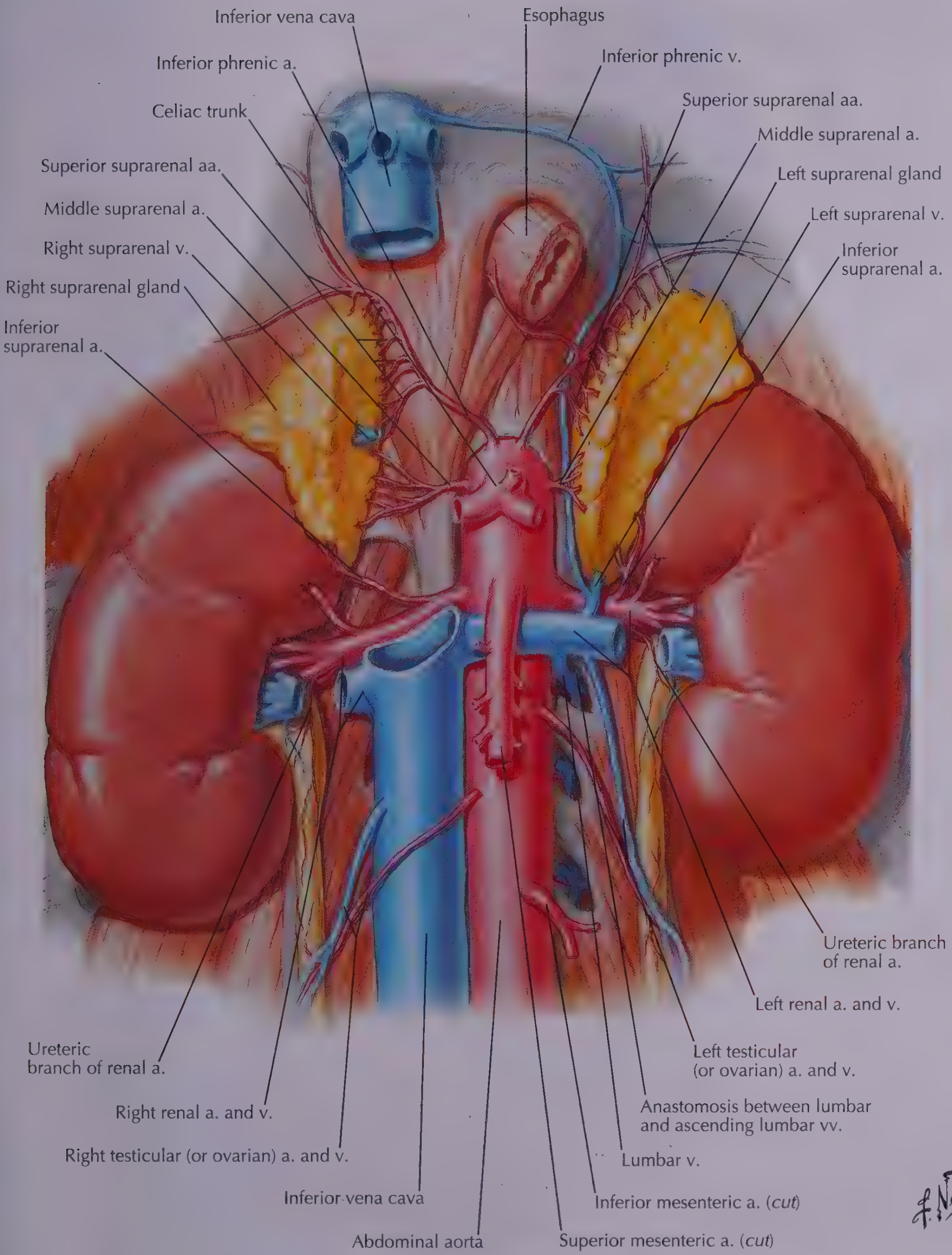

Latissimus dorsi m.
Serratus posterior inferior m.
External abdominal oblique m.
Aponeurosis of transversus abdominis m.
Internal abdominal oblique m.
Posterior layer of thoracolumbar fascia
Iliac crest
Erector spinae
Gluteal aponeurosis (over gluteus medius m.)
Gluteus maximus m.
10
11
12
Costal pleura
Lumbocostal ligament
Quadratus lumborum m. (*cut*)
Diaphragm
Subcostal n.
Right kidney
Ascending colon
Transversus abdominis m.
Iliohypogastric n.
Ilioinguinal n.
Quadratus lumborum m. (*cut*)
Psoas major
Iliolumbar ligament



Posterior relations of kidneys

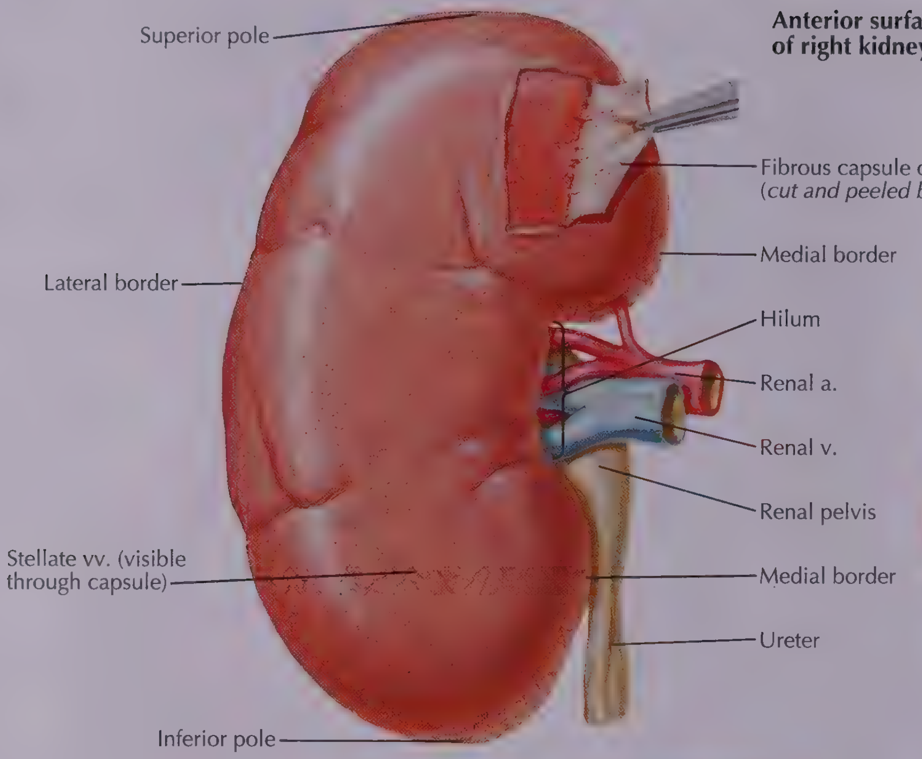
Aorta
Inferior vena cava
Projection of 11th rib
Area for diaphragm
Projection of 12th rib
Area for aponeurosis of transversus abdominis m.
Area for quadratus lumborum m.
Area for psoas major
Area for diaphragm
Projection of 12th rib
Area for aponeurosis of transversus abdominis m.
Area for quadratus lumborum m.
Area for psoas major

See also Plates 342, BP 70


Inferior vena cava
Inferior phrenic a.
Celiac trunk
Superior suprarenal aa.
Middle suprarenal a.
Right suprarenal v.
Right suprarenal gland
Inferior suprarenal a.
Esophagus
Inferior phrenic v.
Superior suprarenal aa.
Middle suprarenal a.
Left suprarenal gland
Left suprarenal v.
Inferior suprarenal a.
Ureteric branch of renal a.
Left renal a. and v.
Left testicular (or ovarian) a. and v.
Anastomosis between lumbar and ascending lumbar vv.
Lumbar v.
Inferior mesenteric a. (cut)
Superior mesenteric a. (cut)
Abdominal aorta
Inferior vena cava
Right testicular (or ovarian) a. and v.
Right renal a. and v.
Ureteric branch of renal a.
F. Netter M.D.

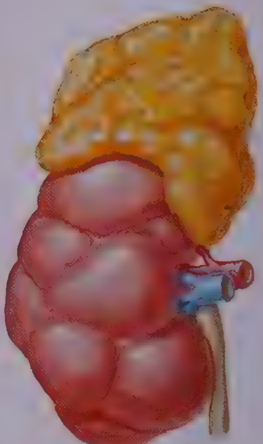
Gross Structure of Kidney

See also Plates 71, 72

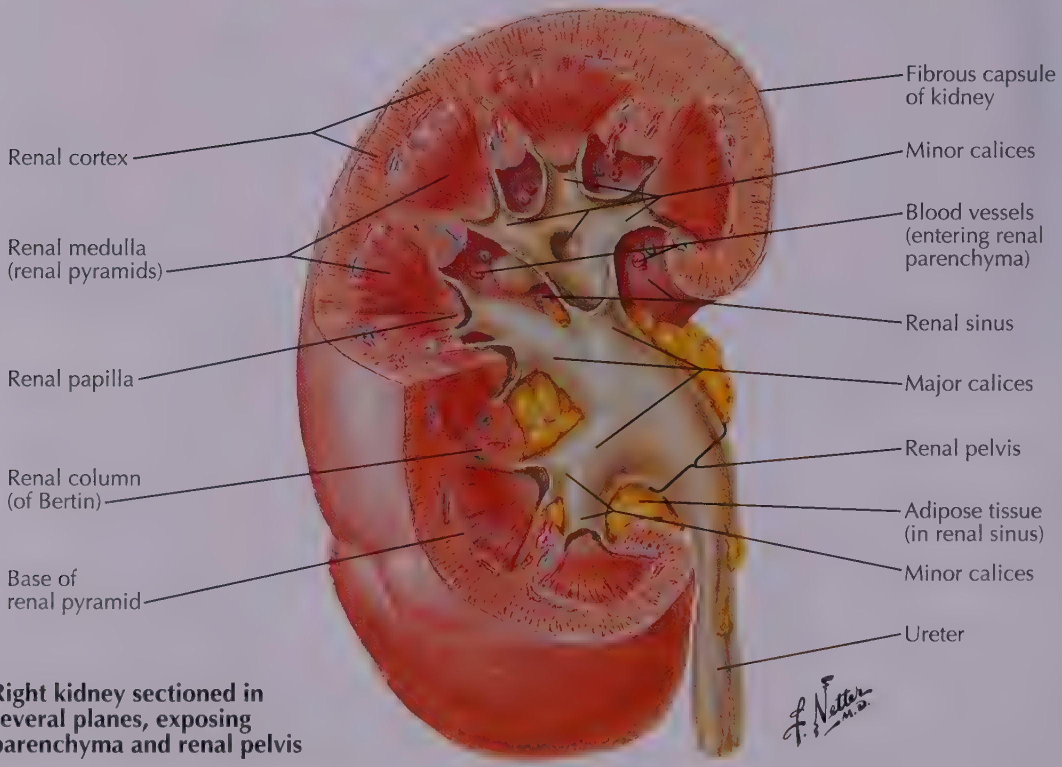


Anterior surface of right kidney

Superior pole
Fibrous capsule of kidney (*cut and peeled back*)
Medial border
Lateral border
Hilum
Renal a.
Renal v.
Renal pelvis
Stellate vv. (visible through capsule)
Medial border
Ureter
Inferior pole



Suprarenal gland and lobulated kidney of infant

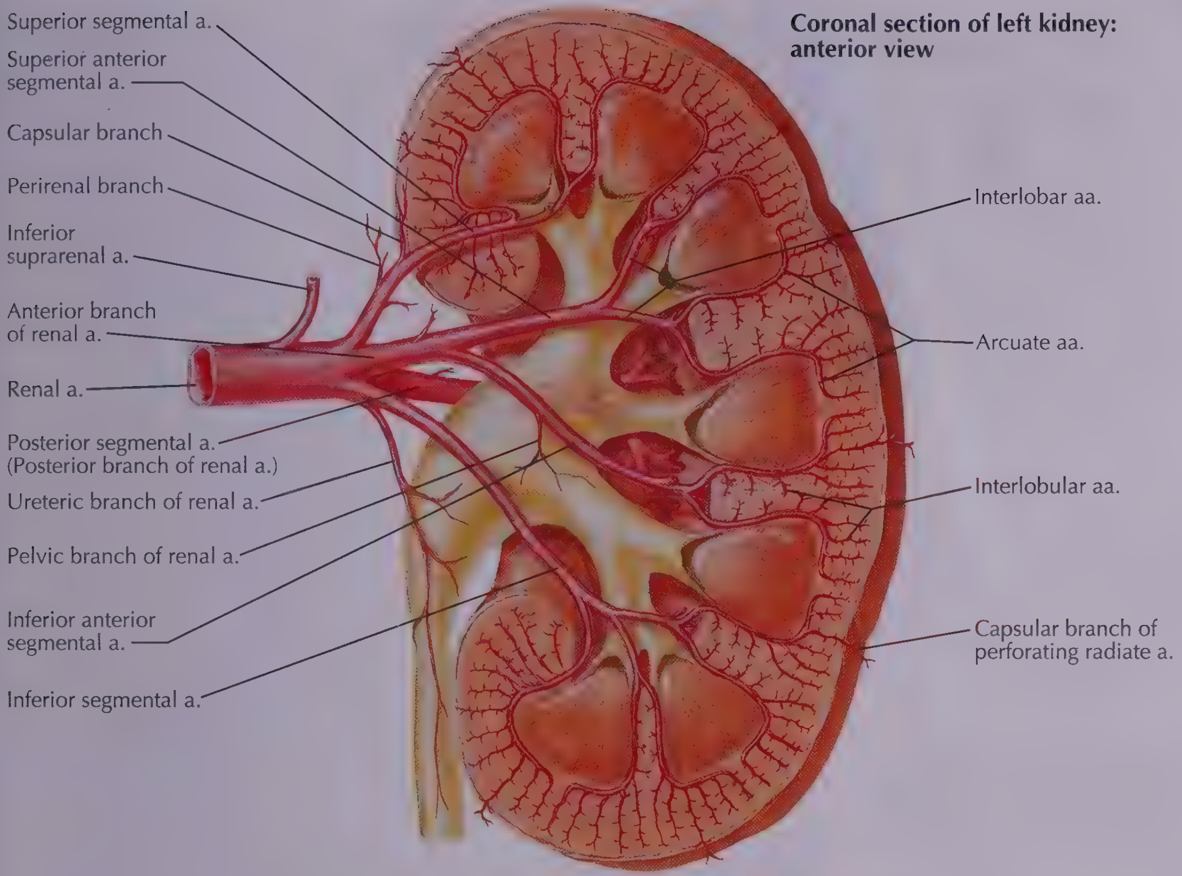


Right kidney sectioned in several planes, exposing parenchyma and renal pelvis

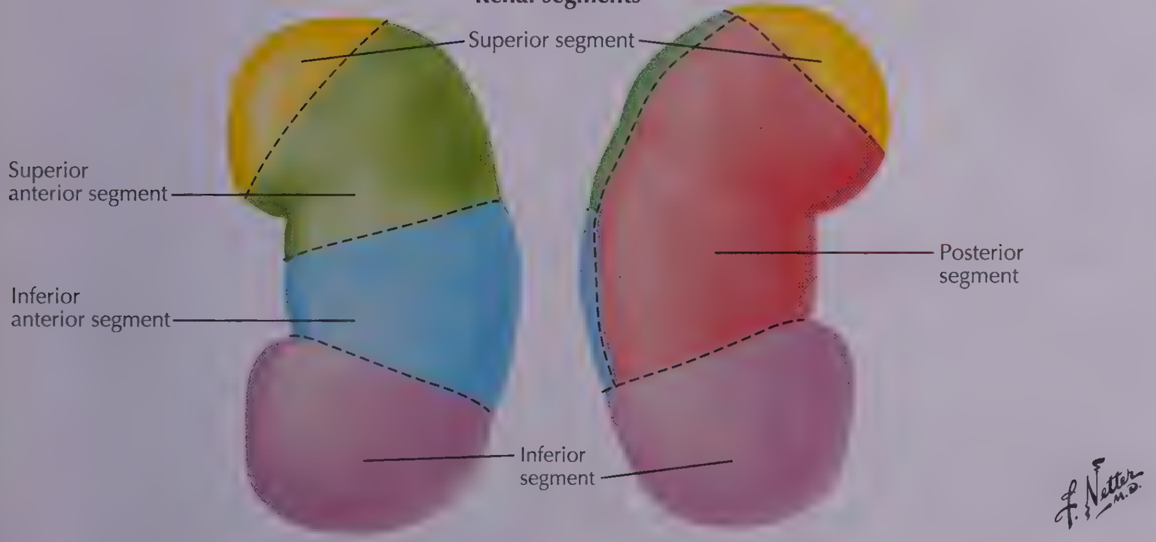
Renal cortex
Fibrous capsule of kidney
Minor calices
Renal medulla (renal pyramids)
Blood vessels (entering renal parenchyma)
Renal sinus
Renal papilla
Major calices
Renal pelvis
Renal column (of Bertin)
Adipose tissue (in renal sinus)
Minor calices
Base of renal pyramid
Ureter
F. Netter M.D.

See also Plate BP 73

Coronal section of left kidney: anterior view


Superior segmental a.
Superior anterior segmental a.
Capsular branch
Perirenal branch
Inferior suprarenal a.
Anterior branch of renal a.
Renal a.
Posterior segmental a. (Posterior branch of renal a.)
Ureteric branch of renal a.
Pelvic branch of renal a.
Inferior anterior segmental a.
Inferior segmental a.
Interlobar aa.
Arcuate aa.
Interlobular aa.
Capsular branch of perforating radiate a.

Renal segments

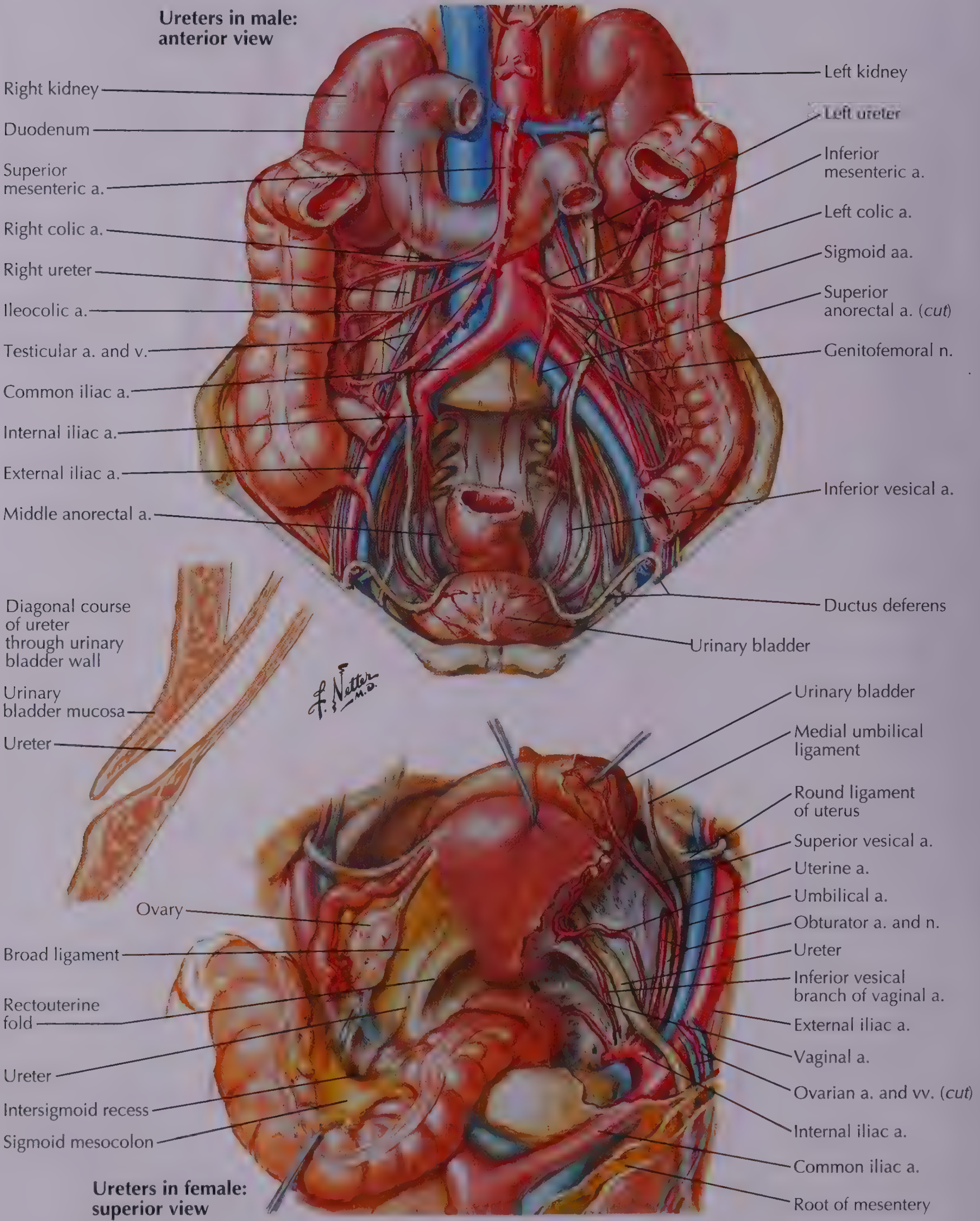

Superior segment
Superior anterior segment
Inferior anterior segment
Posterior segment
Inferior segment
F. Netter M.D.

Anterior surface of left kidney

Posterior surface of left kidney

Ureters in Abdomen and Pelvis

See also Plates 363, 365, 367

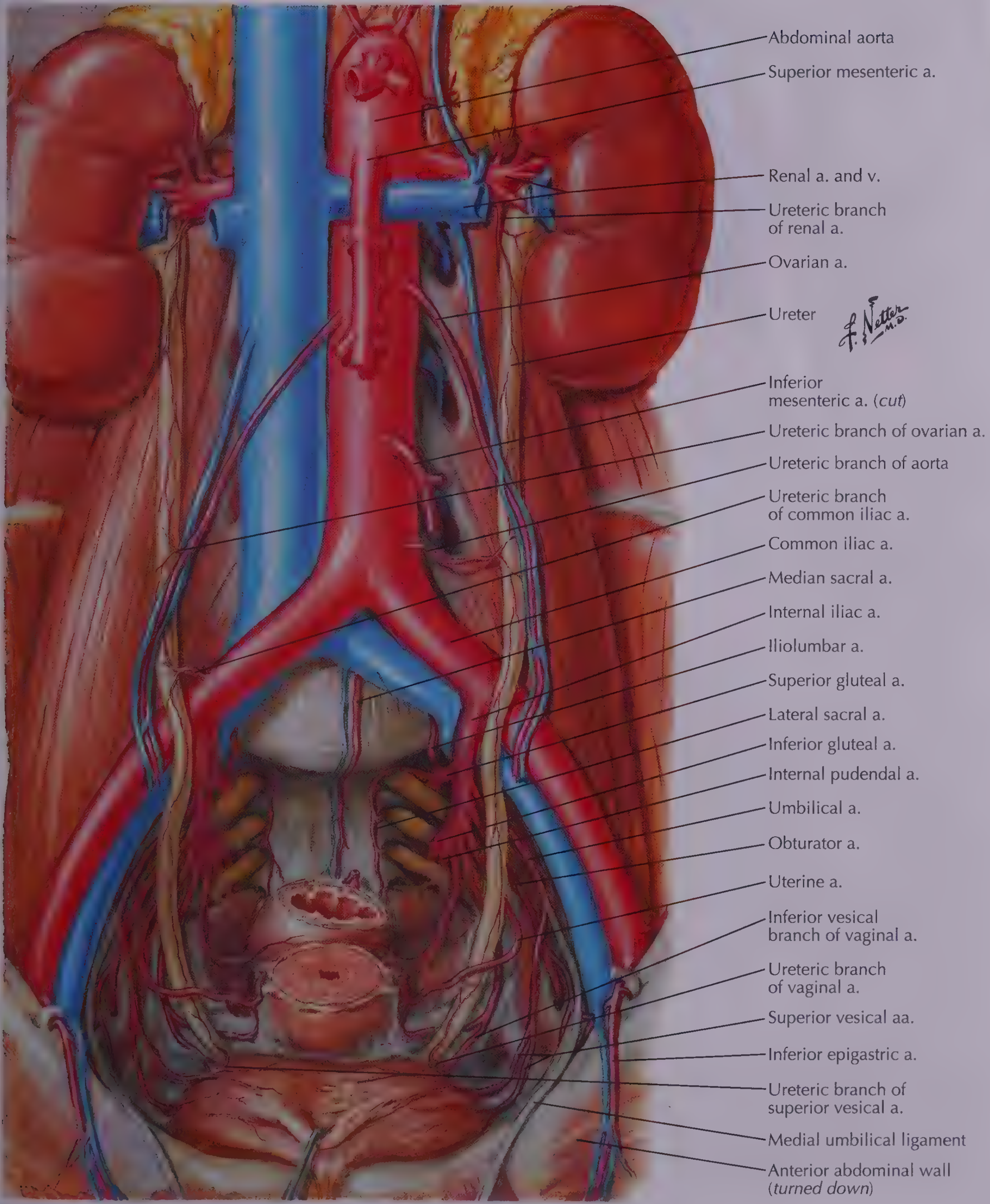


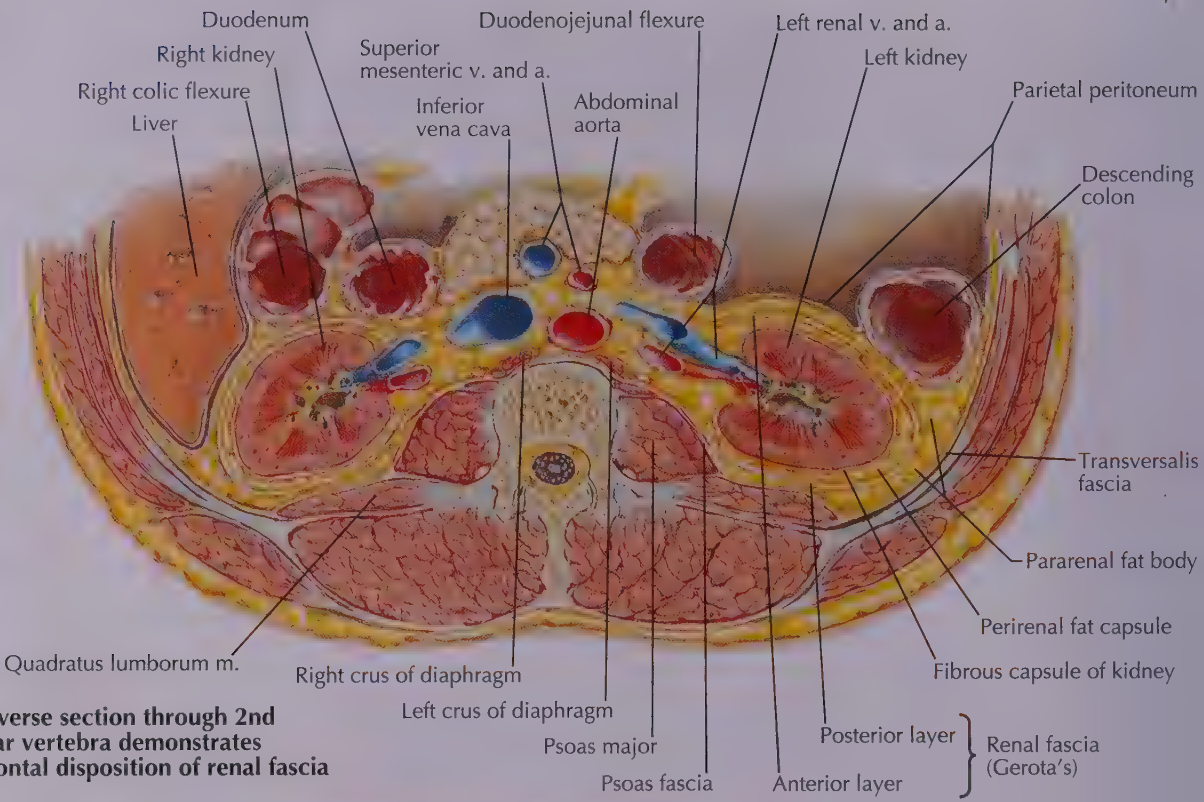
Ureters in male: anterior view

Right kidney
Duodenum
Superior mesenteric a.
Right colic a.
Right ureter
Ileocolic a.
Testicular a. and v.
Common iliac a.
Internal iliac a.
External iliac a.
Middle anorectal a.
Left kidney
Left ureter
Inferior mesenteric a.
Left colic a.
Sigmoid aa.
Superior anorectal a. (cut)
Genitofemoral n.
Inferior vesical a.
Ductus deferens
Urinary bladder
Diagonal course of ureter through urinary bladder wall
Urinary bladder mucosa
Ureter

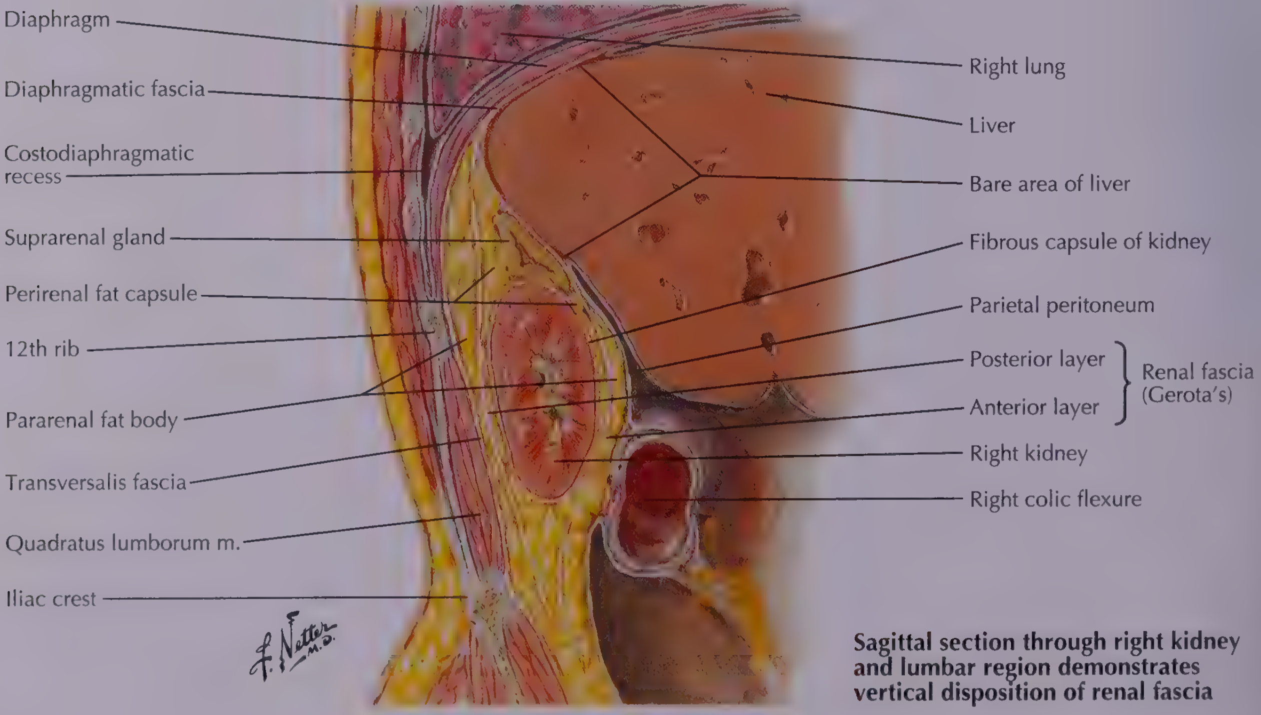
Ureters in female: superior view

Urinary bladder
Medial umbilical ligament
Round ligament of uterus
Superior vesical a.
Uterine a.
Umbilical a.
Obturator a. and n.
Ureter
Inferior vesical branch of vaginal a.
External iliac a.
Vaginal a.
Ovarian a. and vv. (cut)
Internal iliac a.
Common iliac a.
Root of mesentery
Ovary
Broad ligament
Rectouterine fold
Ureter
Intersigmoid recess
Sigmoid mesocolon


Abdominal aorta
Superior mesenteric a.
Renal a. and v.
Ureteric branch of renal a.
Ovarian a.
Ureter
F. Netter M.D.
Inferior mesenteric a. (*cut*)
Ureteric branch of ovarian a.
Ureteric branch of aorta
Ureteric branch of common iliac a.
Common iliac a.
Median sacral a.
Internal iliac a.
Iliolumbar a.
Superior gluteal a.
Lateral sacral a.
Inferior gluteal a.
Internal pudendal a.
Umbilical a.
Obturator a.
Uterine a.
Inferior vesical branch of vaginal a.
Ureteric branch of vaginal a.
Superior vesical aa.
Inferior epigastric a.
Ureteric branch of superior vesical a.
Medial umbilical ligament
Anterior abdominal wall (*turned down*)


Duodenum
Right kidney
Right colic flexure
Liver
Superior mesenteric v. and a.
Inferior vena cava
Duodenojejunal flexure
Abdominal aorta
Left renal v. and a.
Left kidney
Parietal peritoneum
Descending colon
Transversalis fascia
Pararenal fat body
Perirenal fat capsule
Fibrous capsule of kidney
Quadratus lumborum m.
Right crus of diaphragm
Left crus of diaphragm
Psoas major
Psoas fascia
Posterior layer
Anterior layer
Renal fascia (Gerota's)

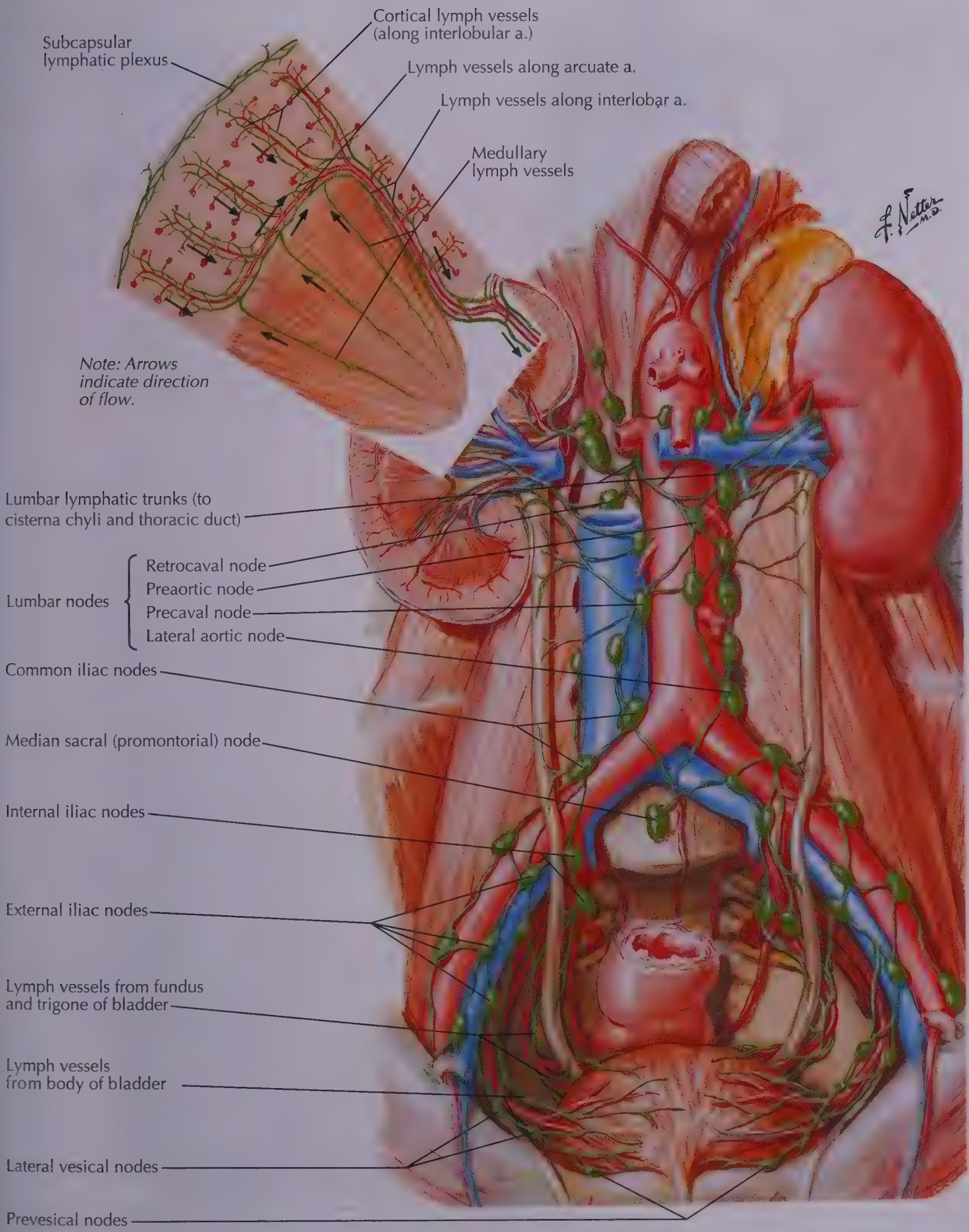
Transverse section through 2nd lumbar vertebra demonstrates horizontal disposition of renal fascia


Diaphragm
Diaphragmatic fascia
Costodiaphragmatic recess
Suprarenal gland
Perirenal fat capsule
12th rib
Pararenal fat body
Transversalis fascia
Quadratus lumborum m.
Iliac crest
Right lung
Liver
Bare area of liver
Fibrous capsule of kidney
Parietal peritoneum
Posterior layer
Anterior layer
Renal fascia (Gerota's)
Right kidney
Right colic flexure
F. Netter M.D.

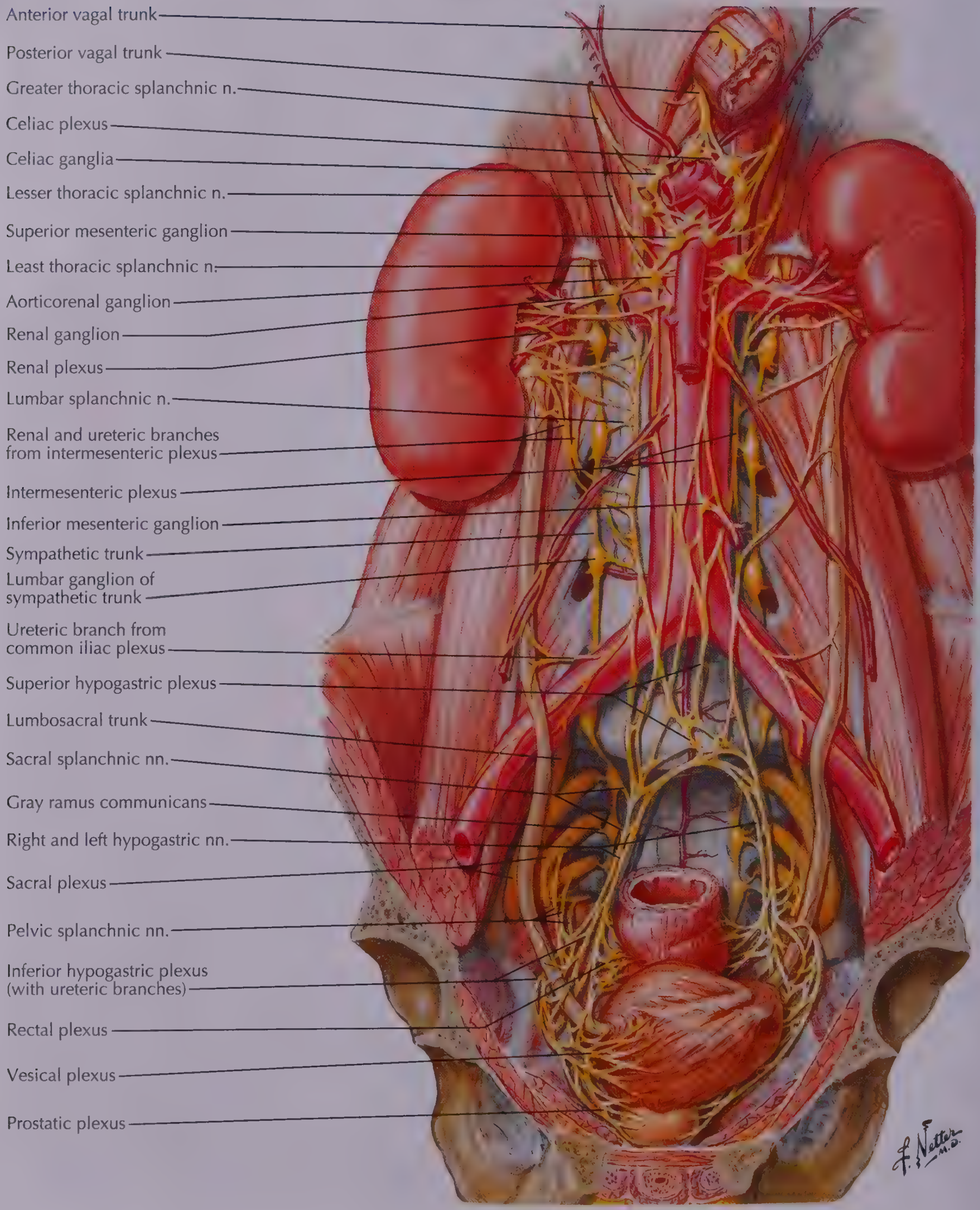
Sagittal section through right kidney and lumbar region demonstrates vertical disposition of renal fascia

Lymph Vessels and Lymph Nodes of Kidneys and Urinary Bladder

See also Plates 408, 410

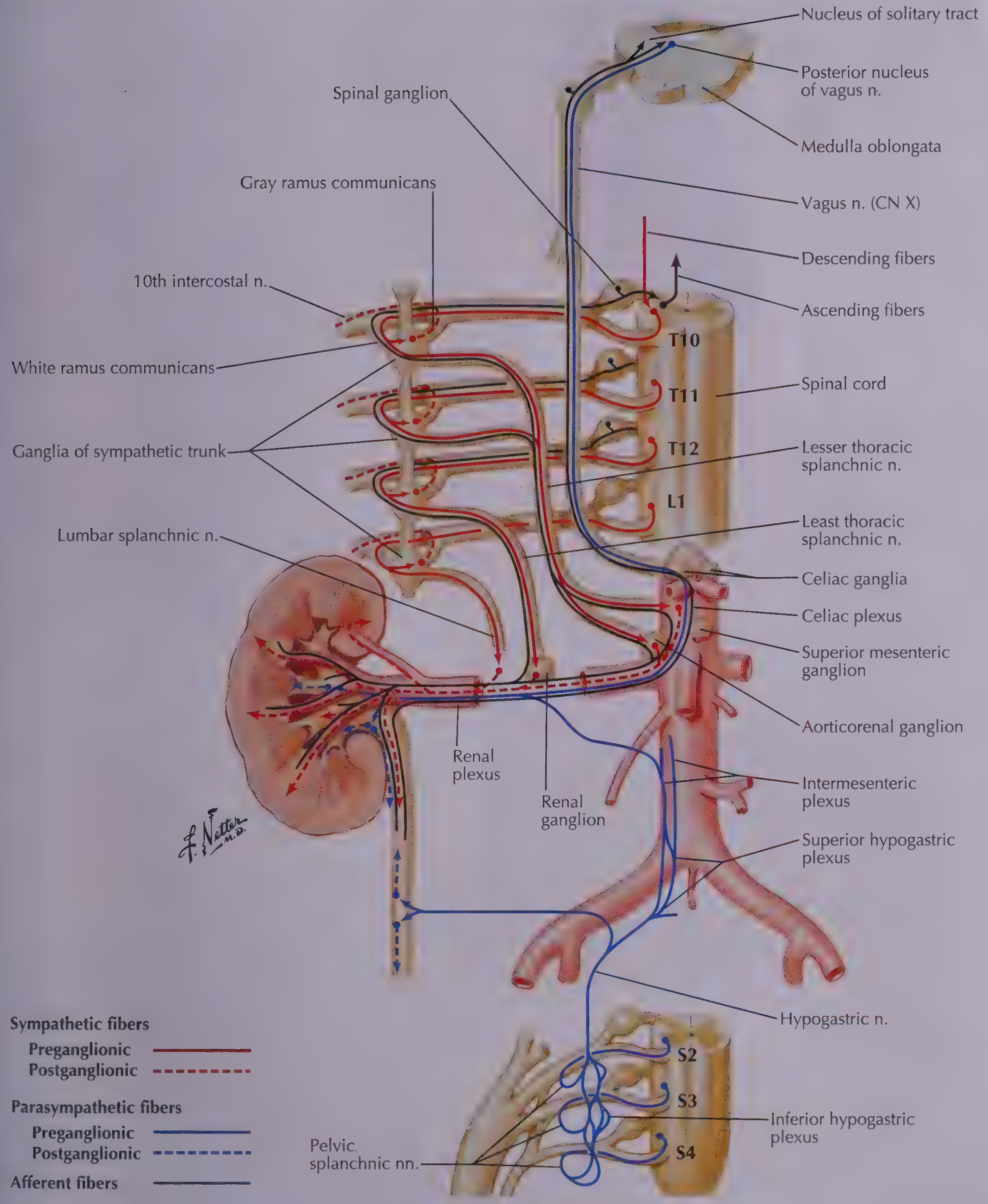

Subcapsular lymphatic plexus
Cortical lymph vessels (along interlobular a.)
Lymph vessels along arcuate a.
Lymph vessels along interlobar a.
Medullary lymph vessels
Note: Arrows indicate direction of flow.
Lumbar lymphatic trunks (to cisterna chyli and thoracic duct)
Lumbar nodes
Retrocaval node
Preaortic node
Precaval node
Lateral aortic node
Common iliac nodes
Median sacral (promontorial) node
Internal iliac nodes
External iliac nodes
Lymph vessels from fundus and trigone of bladder
Lymph vessels from body of bladder
Lateral vesical nodes
Prevesical nodes

Autonomic Nerves of Kidneys, Ureters, and Urinary Bladder


Anterior vagal trunk
Posterior vagal trunk
Greater thoracic splanchnic n.
Celiac plexus
Celiac ganglia
Lesser thoracic splanchnic n.
Superior mesenteric ganglion
Least thoracic splanchnic n.
Aorticorenal ganglion
Renal ganglion
Renal plexus
Lumbar splanchnic n.
Renal and ureteric branches from intermesenteric plexus
Intermesenteric plexus
Inferior mesenteric ganglion
Sympathetic trunk
Lumbar ganglion of sympathetic trunk
Ureteric branch from common iliac plexus
Superior hypogastric plexus
Lumbosacral trunk
Sacral splanchnic nn.
Gray ramus communicans
Right and left hypogastric nn.
Sacral plexus
Pelvic splanchnic nn.
Inferior hypogastric plexus (with ureteric branches)
Rectal plexus
Vesical plexus
Prostatic plexus
F. Netter M.D.

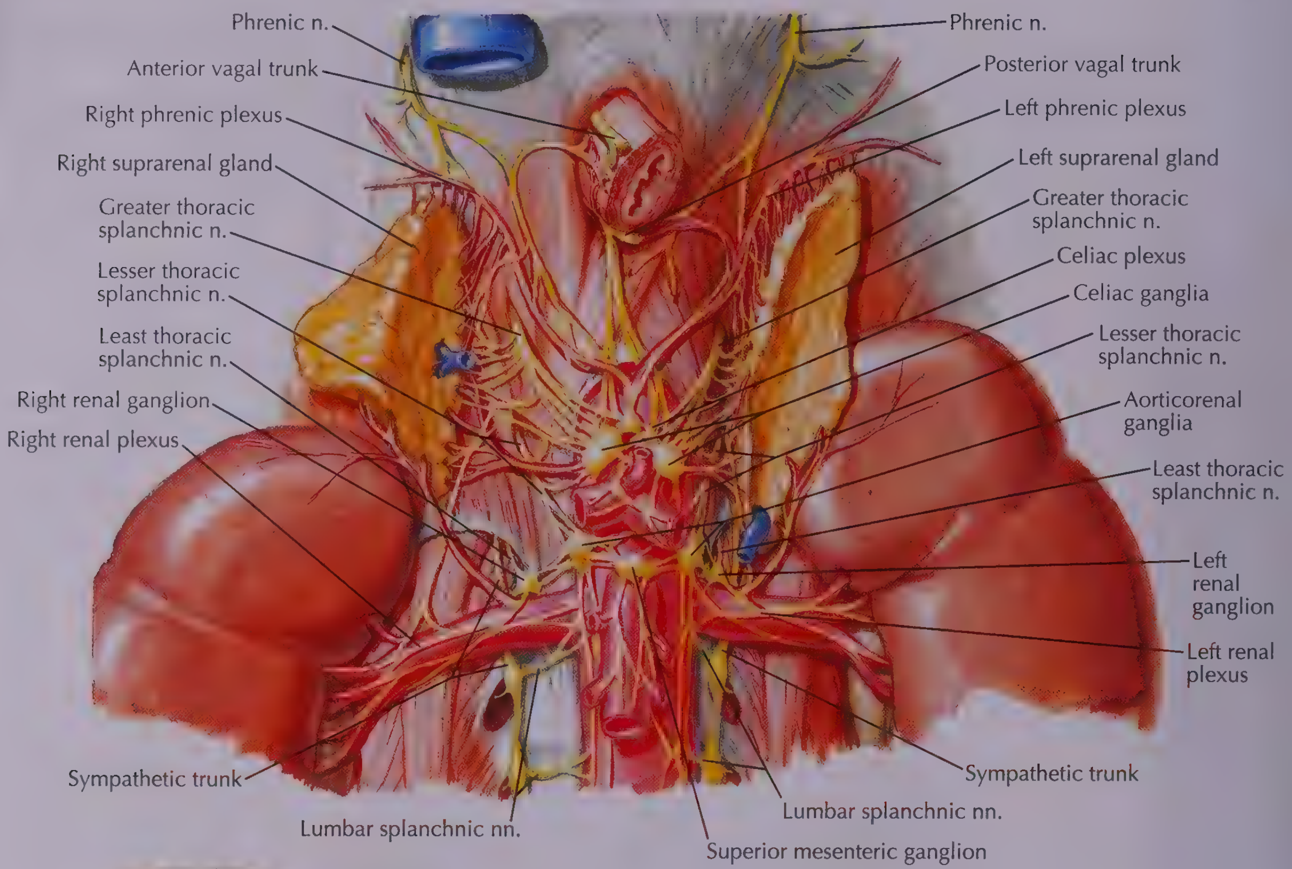
Autonomic Innervation of Kidneys and Abdominal Part of Ureters: Schema

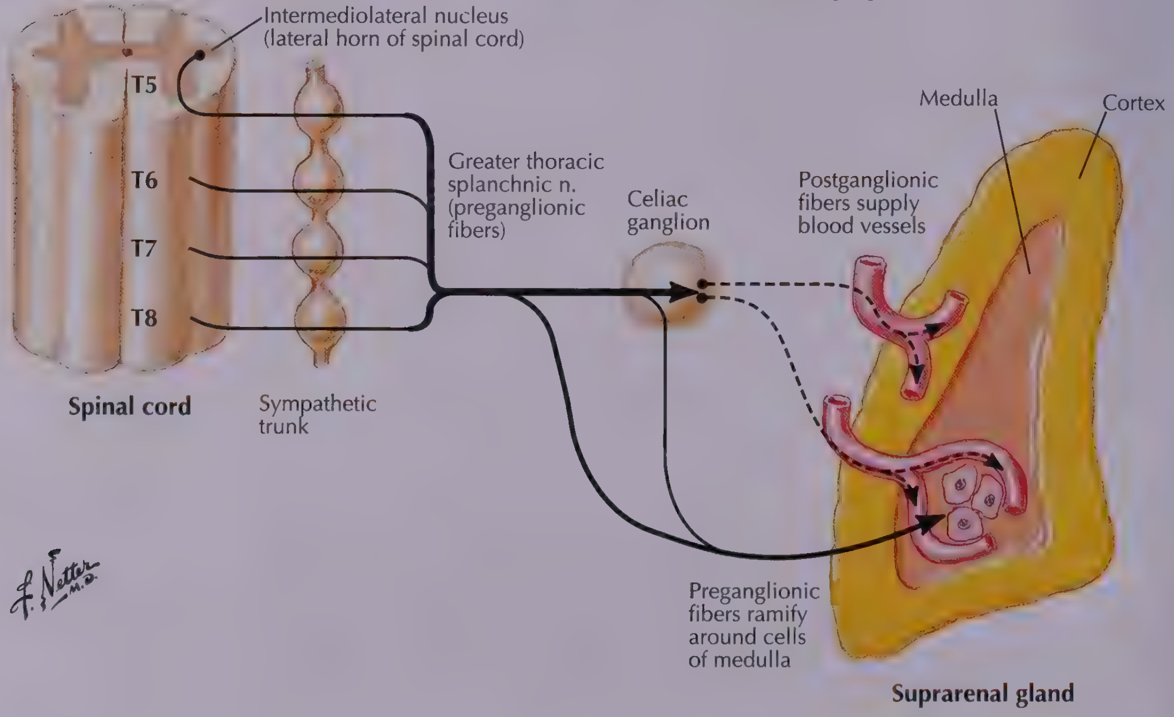
See also Plates 6, 7, 419


Nucleus of solitary tract
Posterior nucleus of vagus n.
Spinal ganglion
Medulla oblongata
Gray ramus communicans
Vagus n. (CN X)
Descending fibers
10th intercostal n.
Ascending fibers
T10
White ramus communicans
T11
Spinal cord
Ganglia of sympathetic trunk
T12
Lesser thoracic splanchnic n.
L1
Lumbar splanchnic n.
Least thoracic splanchnic n.
Celiac ganglia
Celiac plexus
Superior mesenteric ganglion
Aorticorenal ganglion
Renal plexus
Renal ganglion
Intermesenteric plexus
Superior hypogastric plexus
Hypogastric n.
S2
S3
Inferior hypogastric plexus
S4
Pelvic splanchnic nn.
Sympathetic fibers
Preganglionic
Postganglionic
Parasympathetic fibers
Preganglionic
Postganglionic
Afferent fibers

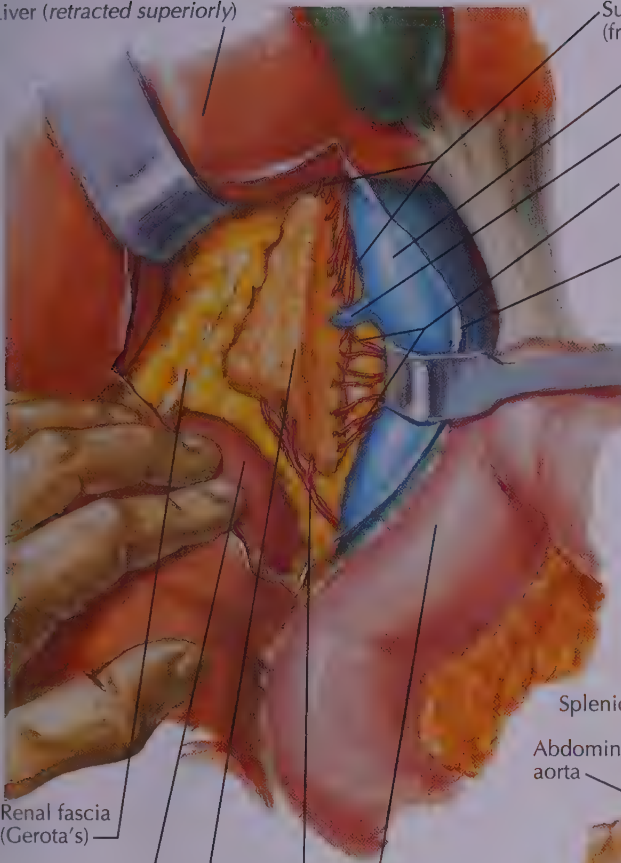
Autonomic Nerves of Suprarenal Glands: Dissection and Schema

See also Plates 6, 7, 342


Phrenic n.
Anterior vagal trunk
Right phrenic plexus
Right suprarenal gland
Greater thoracic splanchnic n.
Lesser thoracic splanchnic n.
Least thoracic splanchnic n.
Right renal ganglion
Right renal plexus
Sympathetic trunk
Lumbar splanchnic nn.
Phrenic n.
Posterior vagal trunk
Left phrenic plexus
Left suprarenal gland
Greater thoracic splanchnic n.
Celiac plexus
Celiac ganglia
Lesser thoracic splanchnic n.
Aorticorenal ganglia
Least thoracic splanchnic n.
Left renal ganglion
Left renal plexus
Sympathetic trunk
Lumbar splanchnic nn.
Superior mesenteric ganglion

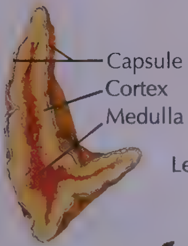

Intermediolateral nucleus (lateral horn of spinal cord)
T5
T6
T7
T8
Spinal cord
Sympathetic trunk
Greater thoracic splanchnic n. (preganglionic fibers)
Celiac ganglion
Postganglionic fibers supply blood vessels
Medulla
Cortex
Preganglionic fibers ramify around cells of medulla
Suprarenal gland

See also Plates 332, 341

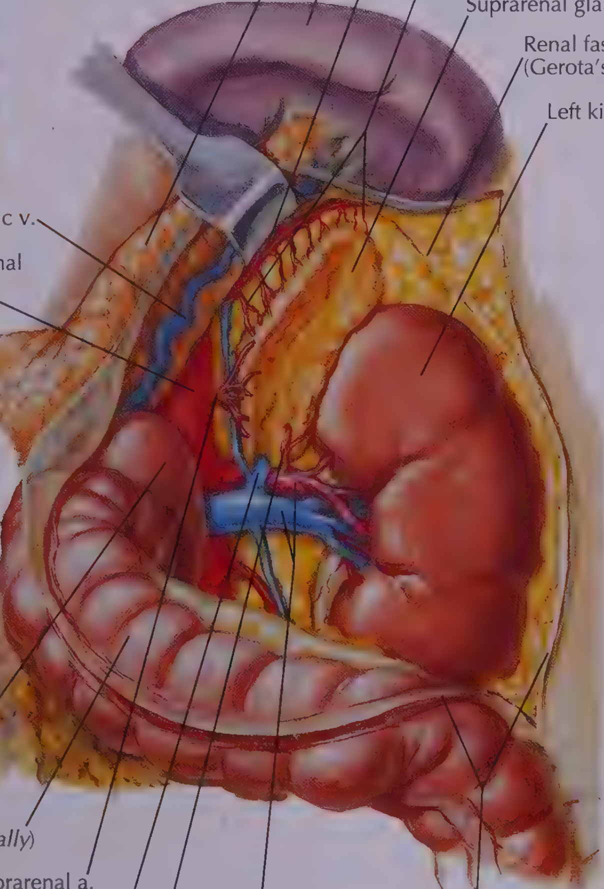

Liver (*retracted superiorly*)
Superior suprarenal aa. (from inferior phrenic a.)
Inferior vena cava (*retracted medially*)
Suprarenal v.
Branches of middle suprarenal a. (from abdominal aorta)
Parietal peritoneum (*cut edge*)
Renal fascia (Gerota's)
Right kidney (*pulled down*)
Suprarenal gland
Inferior suprarenal a. (from renal a.)
Duodenum (*pulled down*)

Abdominal exposure of right suprarenal gland

Cross section through suprarenal gland

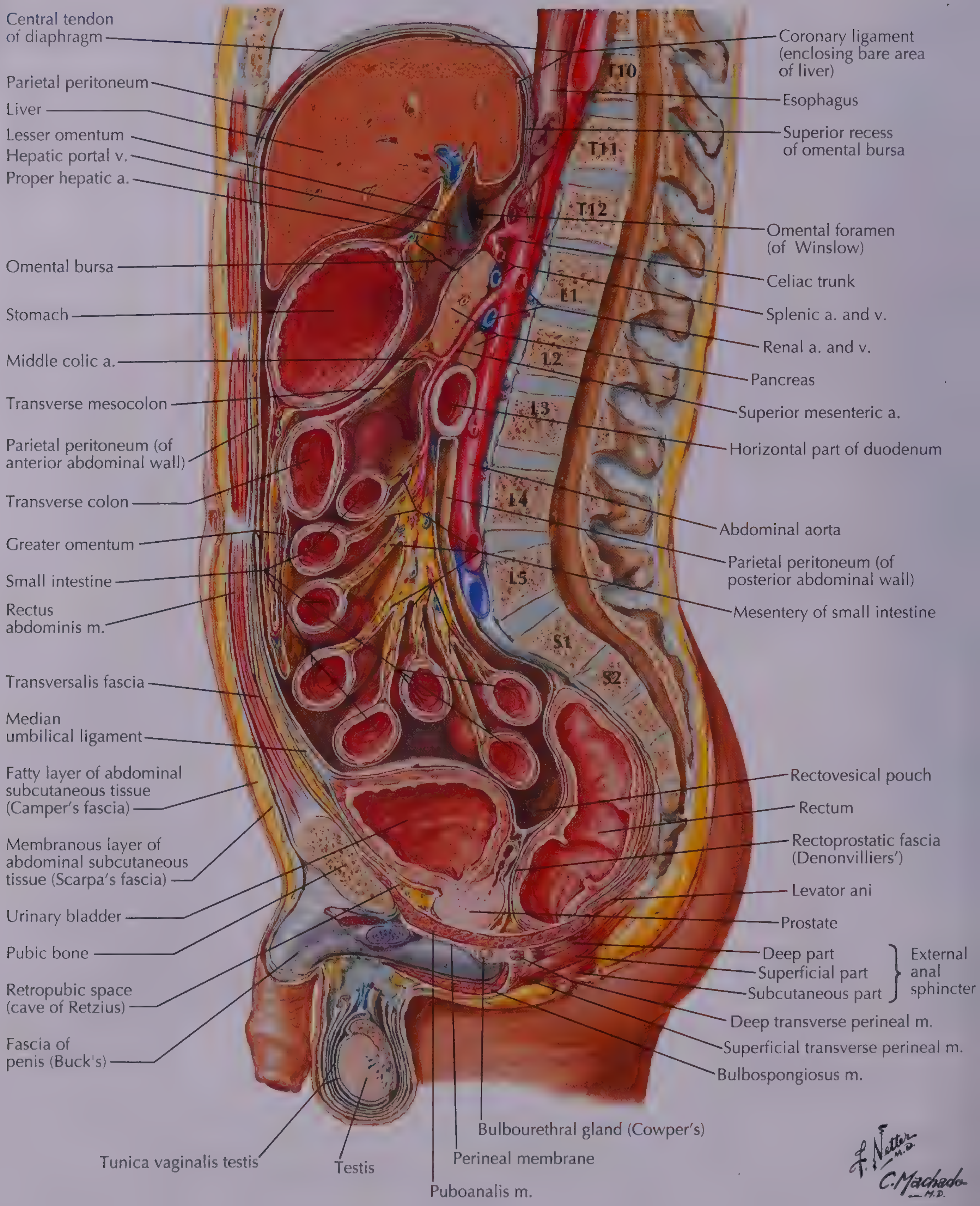

Capsule
Cortex
Medulla

F. Netter M.D.

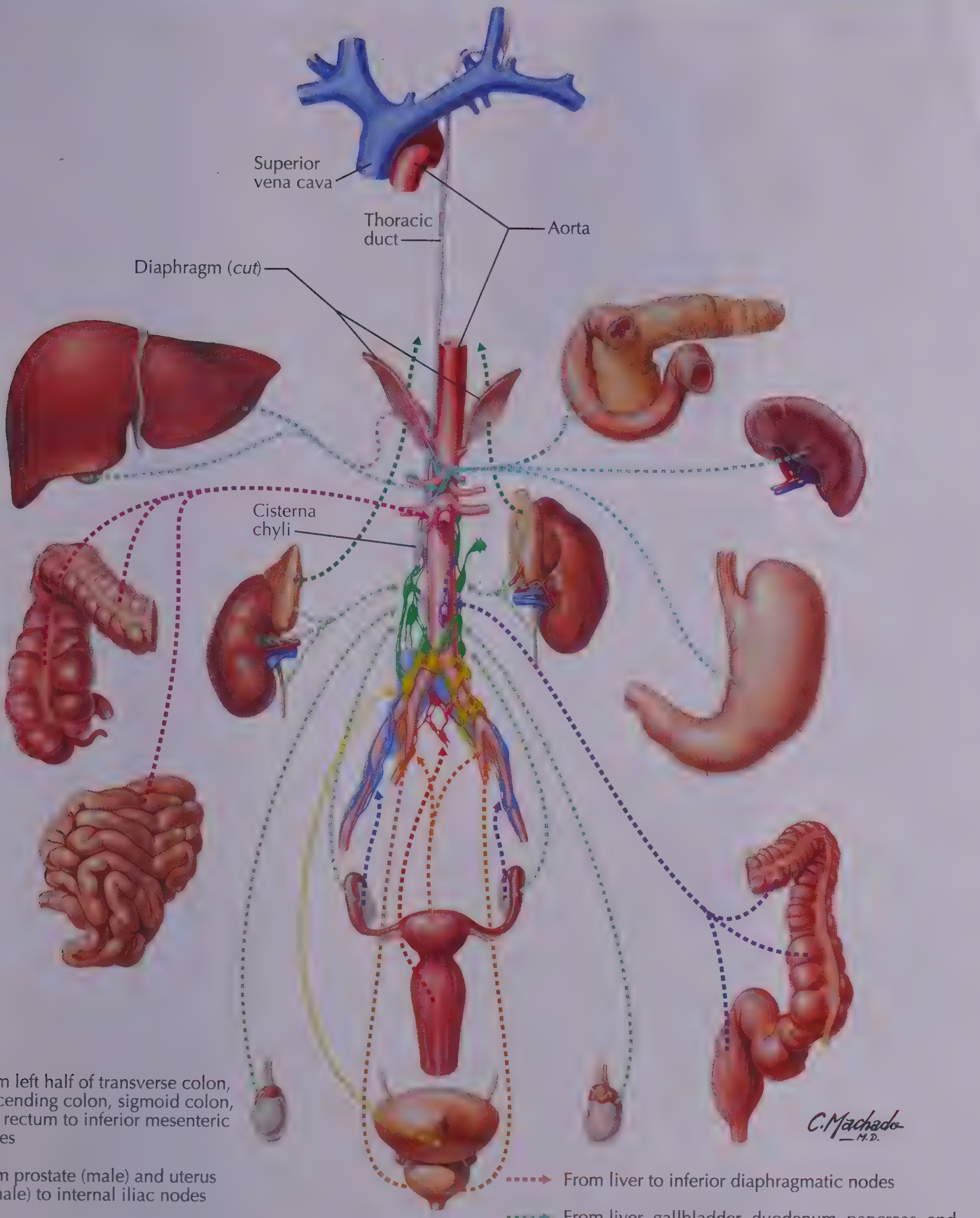

Pancreas (*retracted superiorly*)
Spleen
Left inferior phrenic a.
Superior suprarenal aa.
Suprarenal gland
Renal fascia (Gerota's)
Left kidney
Splenic v.
Abdominal aorta
Duodenojejunal flexure
Left colic flexure (*pulled medially*)
Middle suprarenal a.
Suprarenal v.
Inferior suprarenal a.
Left renal a. and v.
Parietal peritoneum (*cut edges*)

Abdominal exposure of left suprarenal gland

Abdominal Wall and Viscera: Paramedian Section


Central tendon of diaphragm
Parietal peritoneum
Liver
Lesser omentum
Hepatic portal v.
Proper hepatic a.
Omental bursa
Stomach
Middle colic a.
Transverse mesocolon
Parietal peritoneum (of anterior abdominal wall)
Transverse colon
Greater omentum
Small intestine
Rectus abdominis m.
Transversalis fascia
Median umbilical ligament
Fatty layer of abdominal subcutaneous tissue (Camper's fascia)
Membranous layer of abdominal subcutaneous tissue (Scarpa's fascia)
Urinary bladder
Pubic bone
Retropubic space (cave of Retzius)
Fascia of penis (Buck's)
Tunica vaginalis testis
Testis
Puboanalis m.
Perineal membrane
Bulbourethral gland (Cowper's)
Coronary ligament (enclosing bare area of liver)
Esophagus
Superior recess of omental bursa
Omental foramen (of Winslow)
Celiac trunk
Splenic a. and v.
Renal a. and v.
Pancreas
Superior mesenteric a.
Horizontal part of duodenum
Abdominal aorta
Parietal peritoneum (of posterior abdominal wall)
Mesentery of small intestine
Rectovesical pouch
Rectum
Rectoprostatic fascia (Denonvilliers')
Levator ani
Prostate
Deep part
Superficial part
Subcutaneous part
External anal sphincter
Deep transverse perineal m.
Superficial transverse perineal m.
Bulbospongiosus m.
T10
T11
T12
L1
L2
L3
L4
L5
S1
S2
F. Netter M.D.
C. Machado M.D.

Lymphatic Drainage of Abdomen and Pelvis: Schema


Superior vena cava
Thoracic duct
Aorta
Diaphragm (*cut*)
Cisterna chyli
C. Machado M.D.

····➔ From left half of transverse colon, descending colon, sigmoid colon, and rectum to inferior mesenteric nodes

····➔ From prostate (male) and uterus (female) to internal iliac nodes

····➔ From urinary bladder to common iliac nodes

····➔ From vagina to sacral nodes

····➔ From ovaries to external iliac nodes

····➔ From suprarenal glands to posterior mediastinal nodes

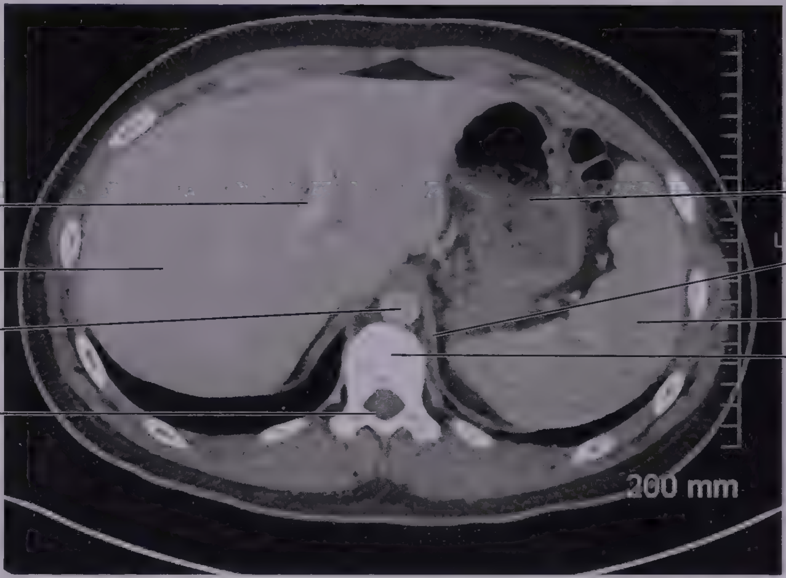
····➔ From liver to inferior diaphragmatic nodes

····➔ From liver, gallbladder, duodenum, pancreas, and spleen to celiac nodes

····➔ From jejunum, ileum, cecum, ascending colon, and right half of transverse colon to superior mesenteric nodes

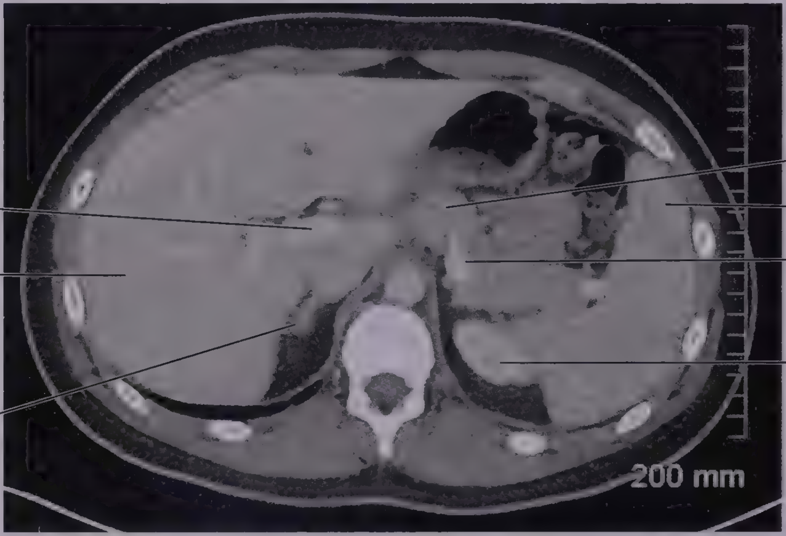
····➔ From kidneys, suprarenal glands, ureters, testes (male), and ovaries (female) to lumbar nodes

Abdominal Scans: Axial CT Images



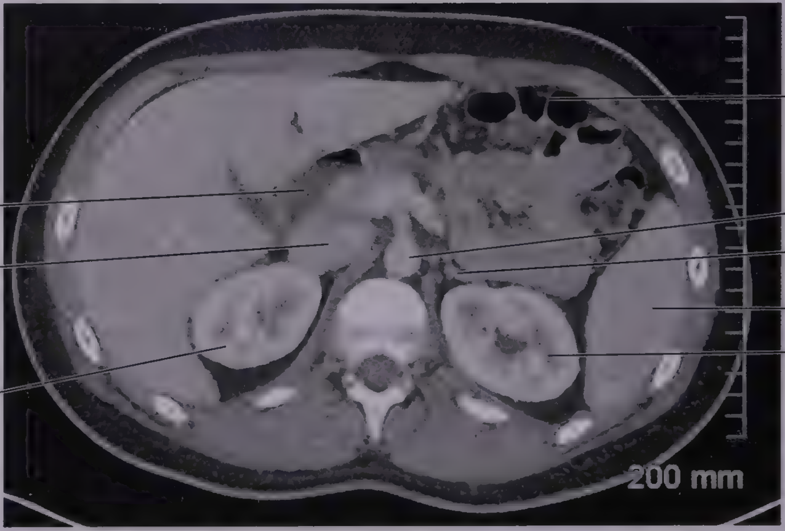
Axial CT image of abdomen with intravenous contrast enhancement

Hepatic portal v.
Liver
Descending aorta
Vertebral canal
Stomach
Left crus of diaphragm
Spleen
Vertebral body
200 mm



Axial CT image of upper abdomen with intravenous contrast enhancement

Hepatic portal v.
Liver
Right suprarenal gland
Body of pancreas
Spleen
Splenic v.
Left kidney
200 mm

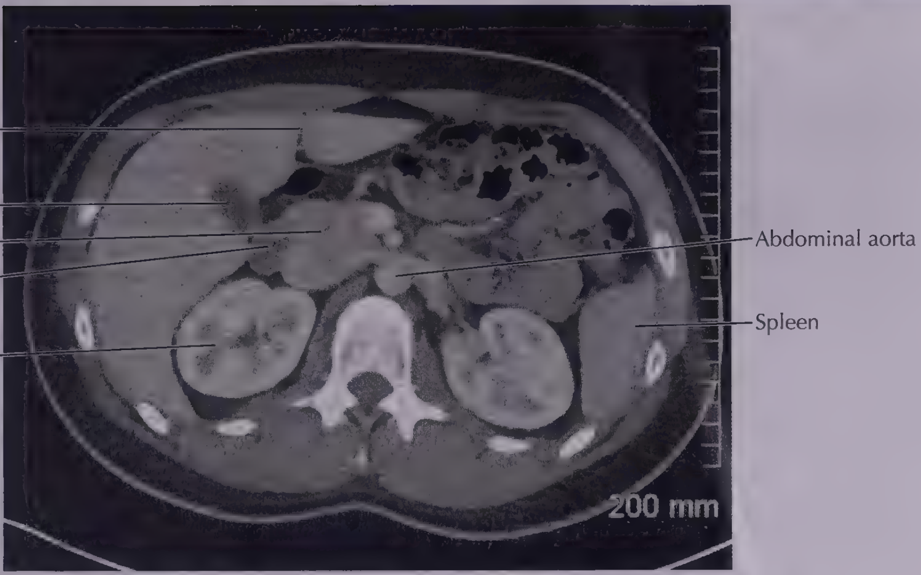


Axial CT image of midabdomen with intravenous contrast enhancement

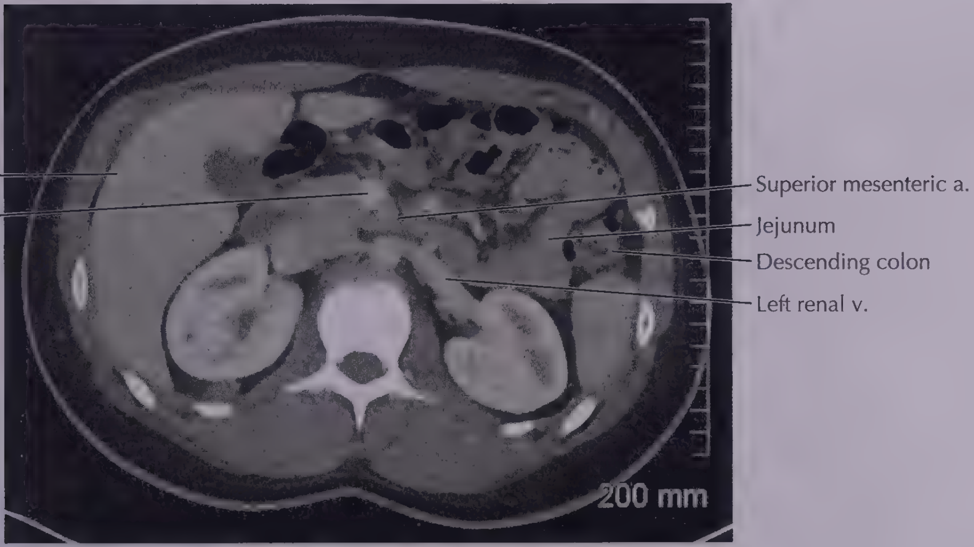
Duodenum
Inferior vena cava
Right kidney
Left colic flexure
Abdominal aorta
Left suprarenal gland
Spleen
Left kidney
200 mm

See also Plate BP 82

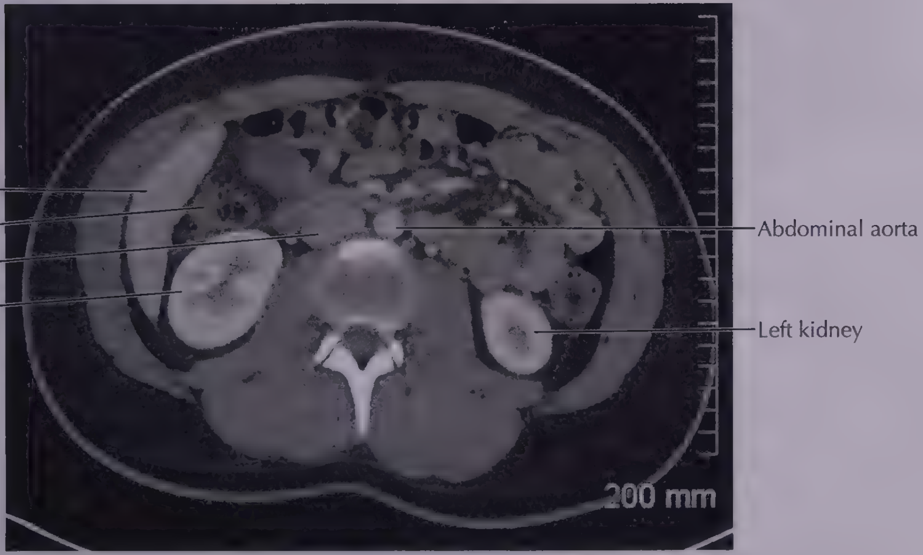
Axial CT image of midabdomen with intravenous contrast enhancement


Falciform ligament
Gallbladder
Head of pancreas
Duodenum
Right kidney
Abdominal aorta
Spleen
200 mm

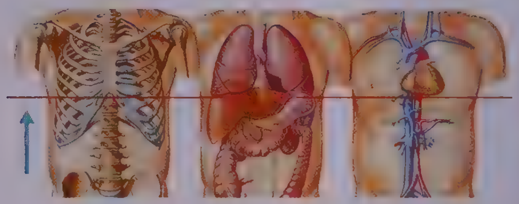
Axial CT image of abdomen with intravenous contrast enhancement

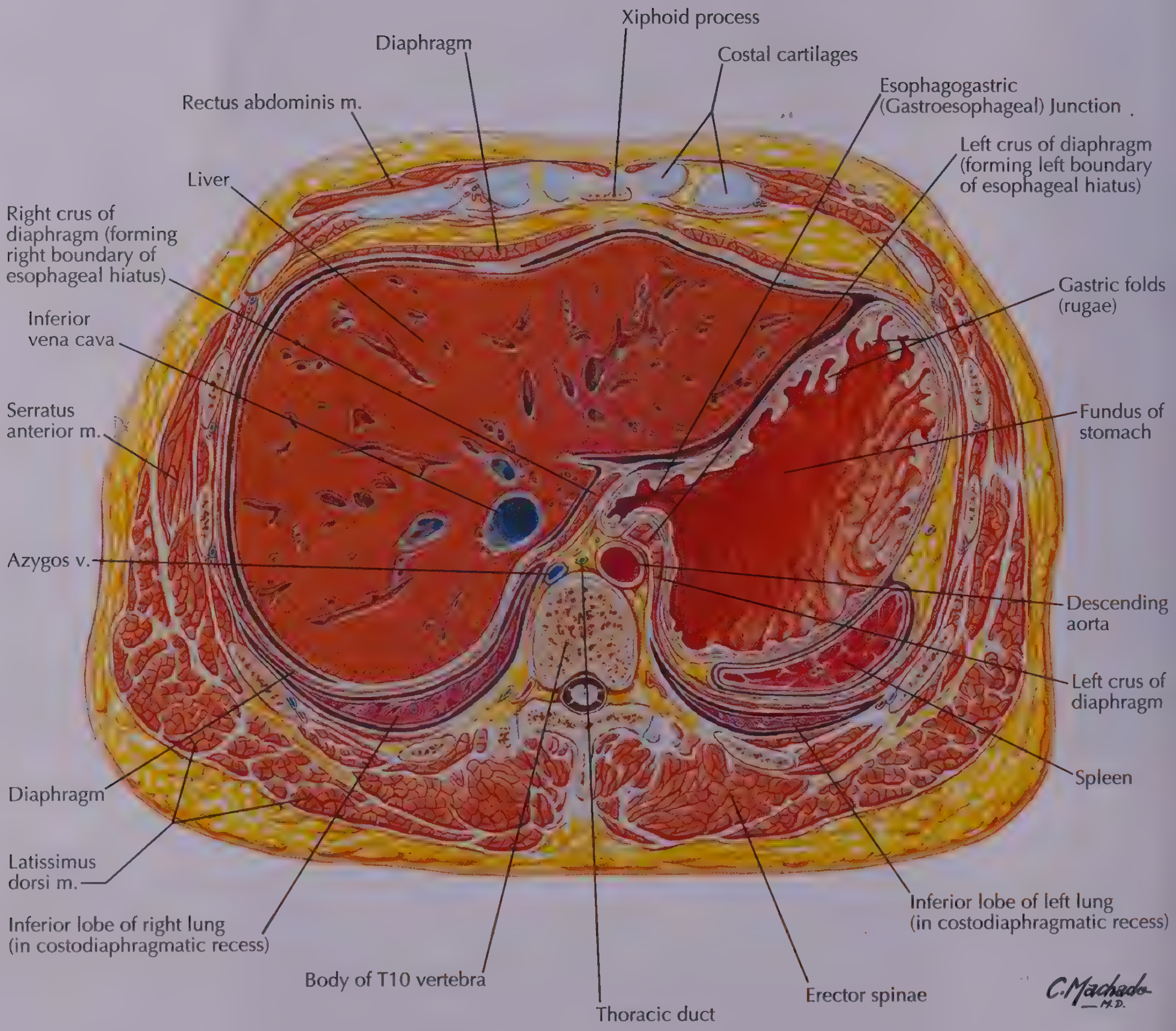

Liver
Superior mesenteric v.
Superior mesenteric a.
Jejunum
Descending colon
Left renal v.
200 mm

Axial CT image of abdomen with intravenous contrast enhancement


Right lobe of liver
Right colic flexure
Inferior vena cava
Right kidney
Abdominal aorta
Left kidney
200 mm

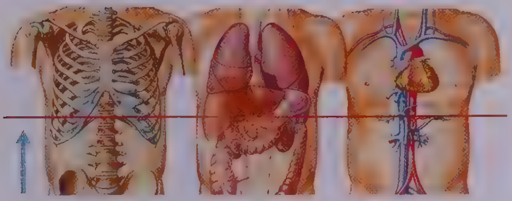
Cross Section at T10 Vertebral Level, Through Esophagogastric Junction

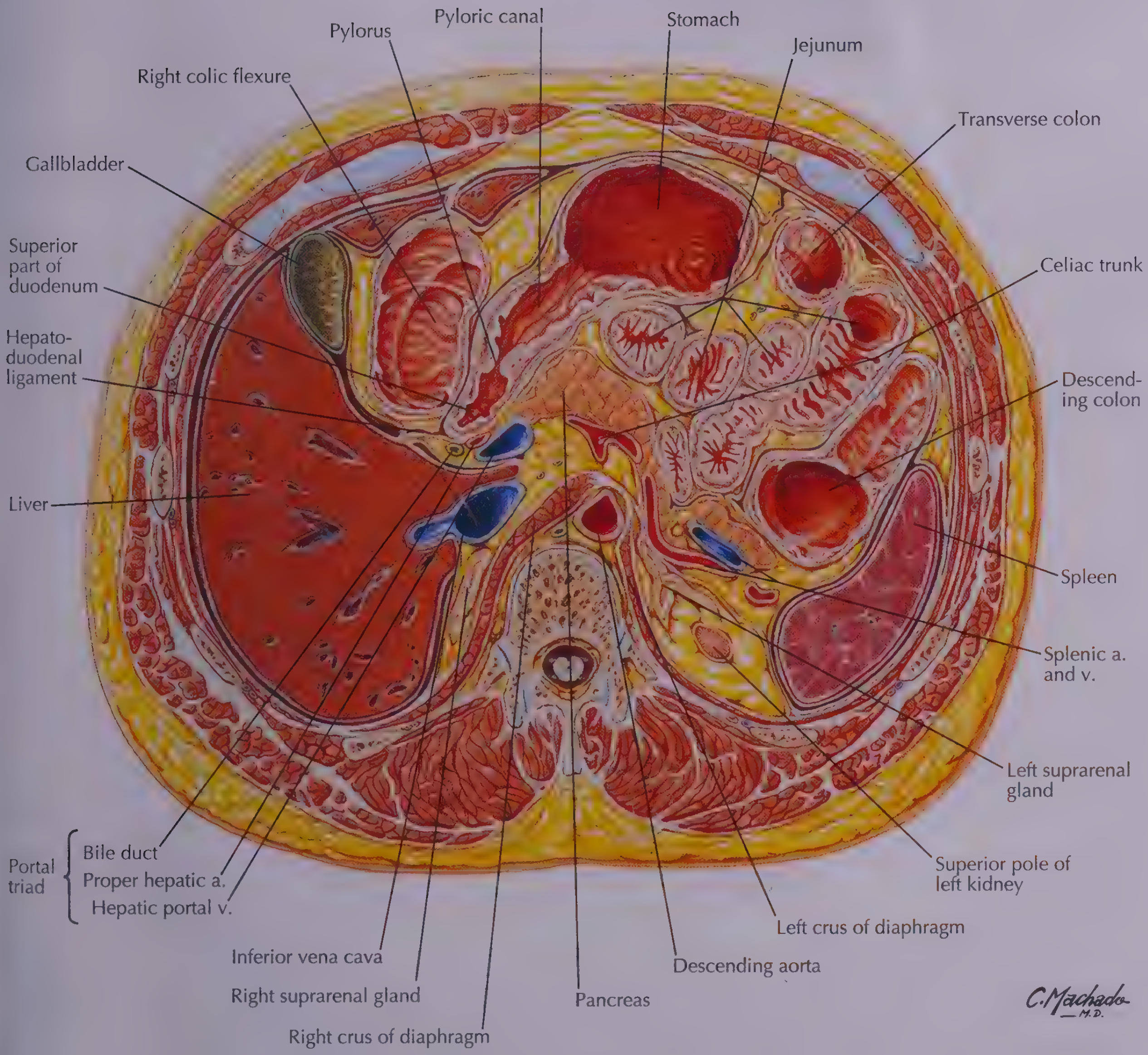



Xiphoid process
Diaphragm
Costal cartilages
Esophagogastric (Gastroesophageal) Junction
Rectus abdominis m.
Left crus of diaphragm (forming left boundary of esophageal hiatus)
Liver
Right crus of diaphragm (forming right boundary of esophageal hiatus)
Gastric folds (rugae)
Inferior vena cava
Serratus anterior m.
Fundus of stomach
Azygos v.
Descending aorta
Left crus of diaphragm
Spleen
Diaphragm
Latissimus dorsi m.
Inferior lobe of right lung (in costodiaphragmatic recess)
Inferior lobe of left lung (in costodiaphragmatic recess)
Body of T10 vertebra
Thoracic duct
Erector spinae
C.Machado M.D.

Cross Section at T12 Vertebral Level, Inferior to Xiphoid Process

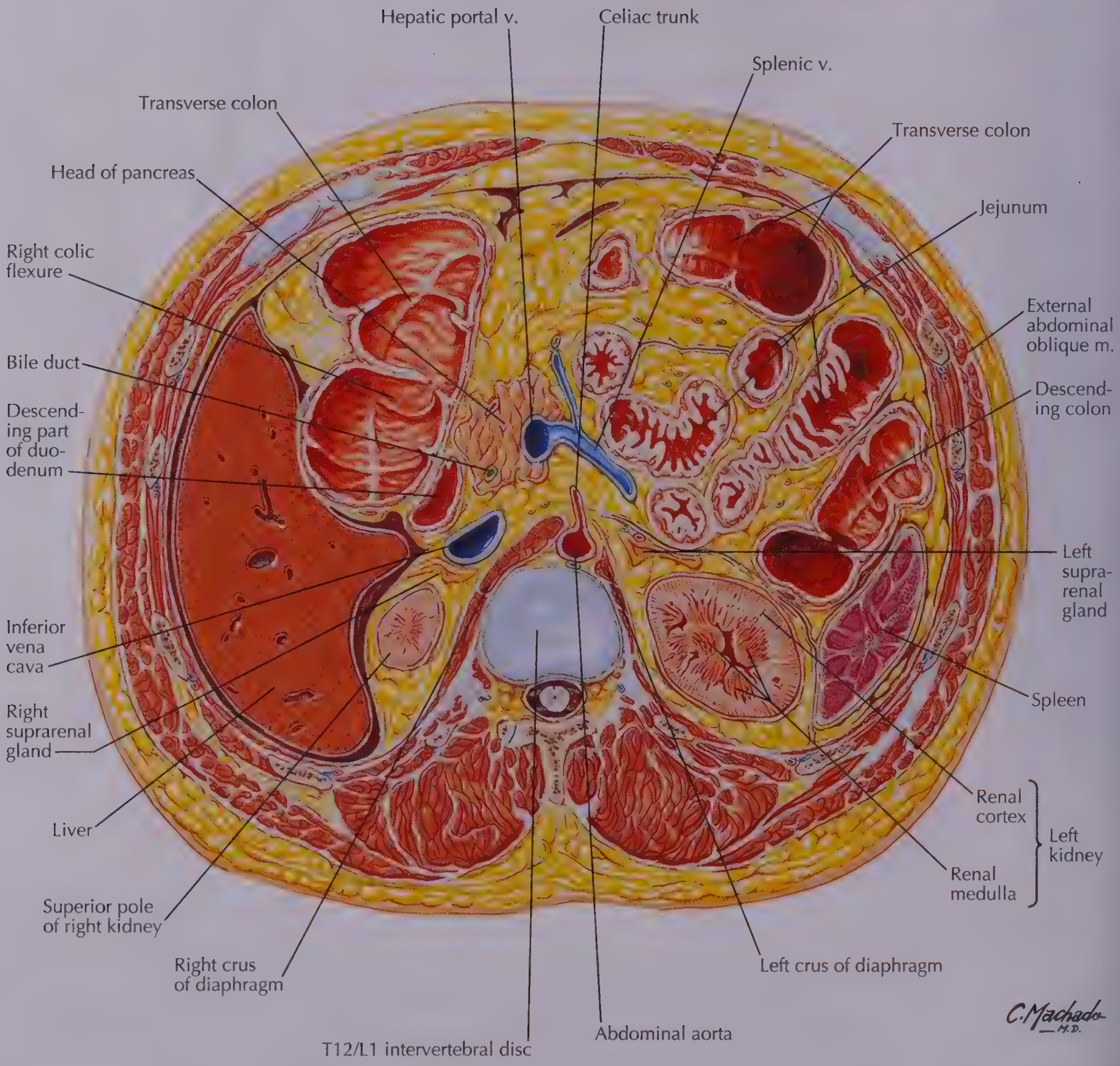
See also Plate BP 79

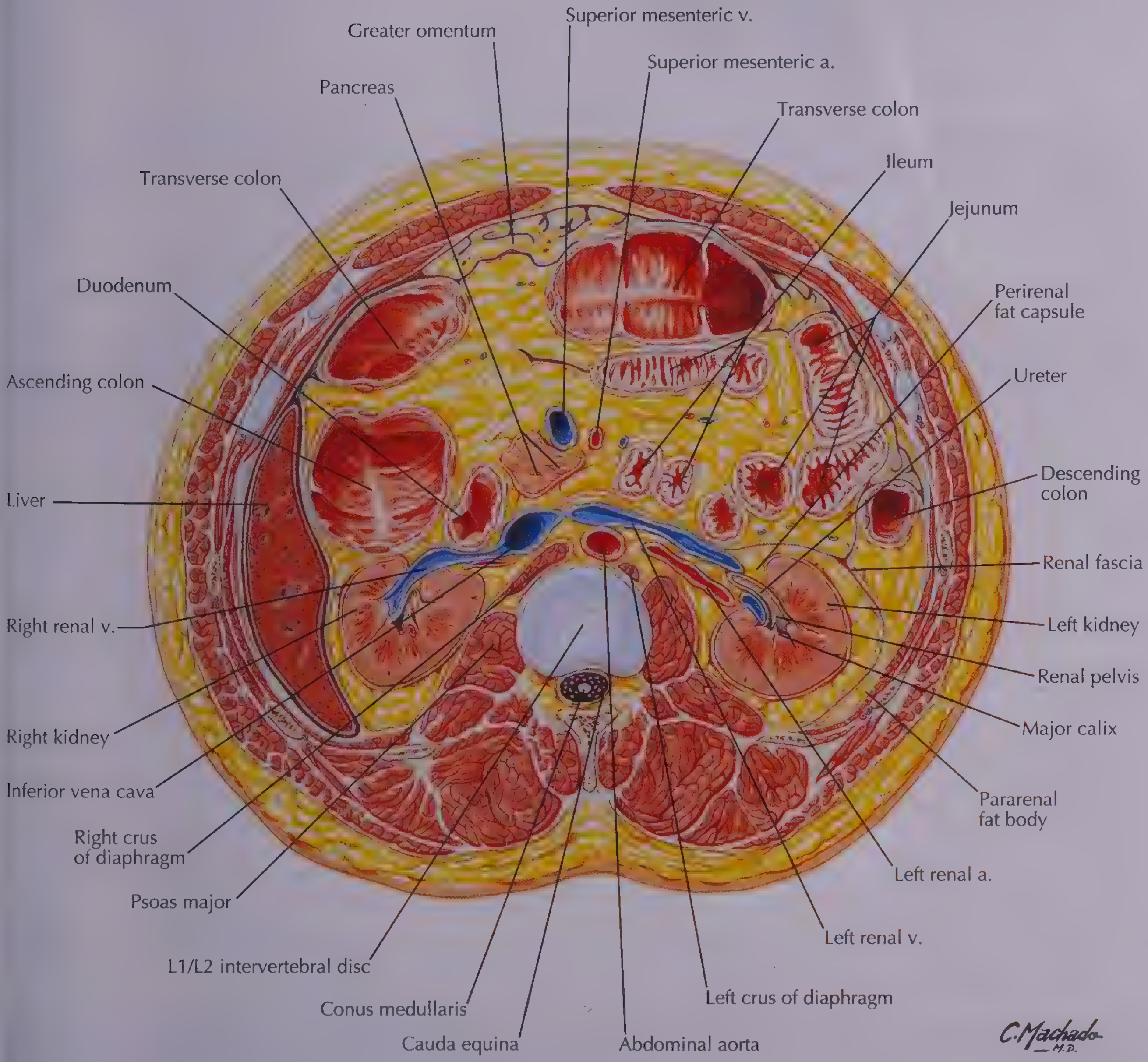



Pylorus
Pyloric canal
Stomach
Jejunum
Right colic flexure
Transverse colon
Gallbladder
Celiac trunk
Superior part of duodenum
Hepato-duodenal ligament
Descending colon
Liver
Spleen
Splenic a. and v.
Left suprarenal gland
Superior pole of left kidney
Portal triad
Bile duct
Proper hepatic a.
Hepatic portal v.
Left crus of diaphragm
Inferior vena cava
Descending aorta
Right suprarenal gland
Pancreas
Right crus of diaphragm
C. Machado M.D.

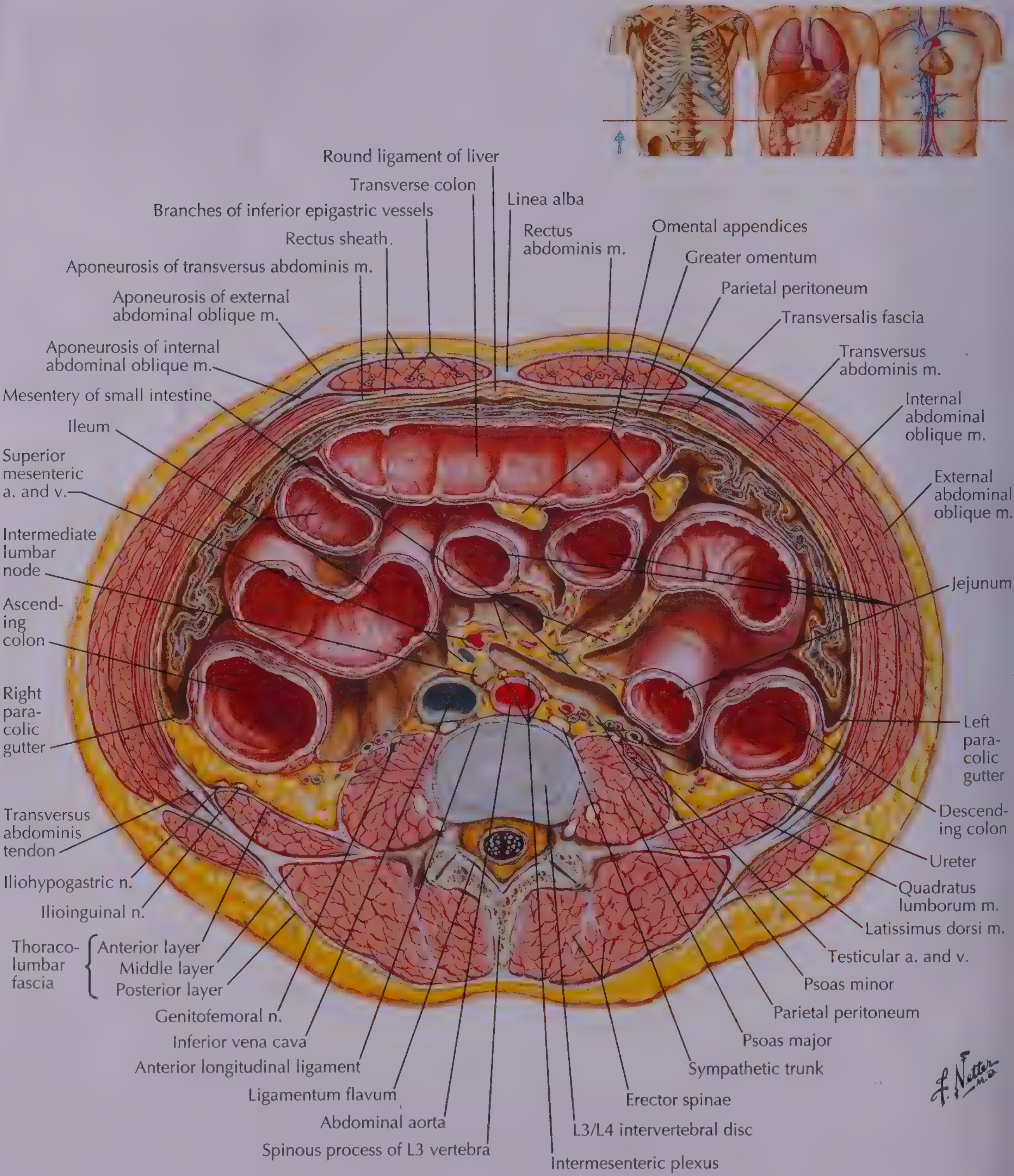
Cross Section at T12/L1 Disc Level

See also Plate BP 79


Hepatic portal v.
Celiac trunk
Splenic v.
Transverse colon
Transverse colon
Head of pancreas
Jejunum
Right colic flexure
External abdominal oblique m.
Bile duct
Descending colon
Descending part of duodenum
Left suprarenal gland
Inferior vena cava
Spleen
Right suprarenal gland
Liver
Renal cortex
Renal medulla
Left kidney
Superior pole of right kidney
Right crus of diaphragm
Left crus of diaphragm
Abdominal aorta
T12/L1 intervertebral disc
C.Machado M.D.


Superior mesenteric v.
Greater omentum
Superior mesenteric a.
Pancreas
Transverse colon
Ileum
Transverse colon
Jejunum
Duodenum
Perirenal fat capsule
Ascending colon
Ureter
Liver
Descending colon
Renal fascia
Right renal v.
Left kidney
Renal pelvis
Right kidney
Major calix
Inferior vena cava
Pararenal fat body
Right crus of diaphragm
Left renal a.
Psoas major
Left renal v.
L1/L2 intervertebral disc
Left crus of diaphragm
Conus medullaris
Cauda equina
Abdominal aorta
C.Machado M.D.

Cross Section at L3/L4 Disc Level


Round ligament of liver
Transverse colon
Linea alba
Branches of inferior epigastric vessels
Rectus sheath
Rectus abdominis m.
Omental appendices
Greater omentum
Aponeurosis of transversus abdominis m.
Parietal peritoneum
Aponeurosis of external abdominal oblique m.
Transversalis fascia
Aponeurosis of internal abdominal oblique m.
Transversus abdominis m.
Mesentery of small intestine
Internal abdominal oblique m.
Ileum
Superior mesenteric a. and v.
External abdominal oblique m.
Intermediate lumbar node
Jejunum
Ascending colon
Right paracolic gutter
Left paracolic gutter
Descending colon
Transversus abdominis tendon
Ureter
Iliohypogastric n.
Quadratus lumborum m.
Ilioinguinal n.
Latissimus dorsi m.
Thoracolumbar fascia
Anterior layer
Middle layer
Posterior layer
Testicular a. and v.
Psoas minor
Genitofemoral n.
Parietal peritoneum
Inferior vena cava
Psoas major
Anterior longitudinal ligament
Sympathetic trunk
Ligamentum flavum
Erector spinae
Abdominal aorta
L3/L4 intervertebral disc
Spinous process of L3 vertebra
Intermesenteric plexus
F. Netter M.D.

ANATOMICAL STRUCTURE	CLINICAL COMMENT	PLATE NUMBERS
Nervous System and Sense Organs		
Ilioinguinal and genitofemoral nerves	Mediate cremasteric reflex; femoral branch of genitofemoral nerve provides cutaneous innervation to skin over femoral triangle	287
Intercostal, subcostal, and iliohypogastric nerves	Convey well-localized pain sensations from abdominal wall and parietal peritoneum; pain in dermatomal distribution indicates problem with spinal nerves (e.g., herpes zoster infection)	278
Celiac ganglion	Some patients with medically intractable pain from chronic pancreatitis or advanced pancreatic malignancy undergo celiac ganglion block; located typically at upper or lower L1 vertebral level	320, 329
Thoracic and lumbar splanchnic nerves (sympathetic)	Convey pain sensations from abdominal viscera that are often referred to other sites; quadrant in which pain is located and site of radiation provide clues to source of pain	324, 325
Iliohypogastric nerve	Nephrectomy through quadratus lumborum muscle can damage iliohypogastric nerve, with resultant anesthesia superior to the pubic symphysis	331
Skeletal System		
Xiphoid process and pubic symphysis	Palpable landmarks used to locate transpyloric plane (of Addison; L1 plane), located halfway between these structures; plane may contain pylorus of stomach, horizontal portion of duodenum, head and neck of pancreas, superior mesenteric artery, and hilum of spleen	267
Anterior superior iliac spine (ASIS)	Palpable landmark used to locate McBurney's point; tenderness over McBurney's point is indication of appendicitis	268, 300
Muscular System		
Linea alba	Site used for abdominal wall incisions because this location provides access to many organs during exploratory surgery and is unlikely to have significant vessels crossing it	267, 272
Inguinal ligament	Surface landmark from ASIS to pubic tubercle that marks division between abdomen and lower limb; formed from external abdominal oblique aponeurosis	267, 271
Inguinal (Hesselbach's) triangle	Important region on interior surface of anterior abdominal wall, bounded by inferior epigastric vessels, inguinal ligament, and rectus abdominis muscle, through which abdominal contents may herniate to produce direct inguinal hernias	274, 280
Deep inguinal ring	Slit-like opening in transversalis fascia just above midpoint of inguinal ligament and lateral to inferior epigastric artery, through which abdominal contents may herniate to produce indirect inguinal hernias	280, 281
Superficial inguinal ring	Triangular opening in external abdominal oblique aponeurosis superior and lateral to pubic tubercle and medial to inferior epigastric artery, through which abdominal contents may herniate to produce indirect inguinal hernias	270, 280, 281
Femoral ring	Superior opening of femoral canal bounded by medial part of inguinal ligament, femoral vein, and lacunar ligament; abdominal contents may herniate through femoral ring into upper femoral triangle situated inferolateral to pubic tubercle, producing femoral hernia	282
Esophageal hiatus	Widening of opening through diaphragm allows stomach to protrude into mediastinum, which can increase incidence of gastroesophageal reflux disease (GERD)	287, 289
Rectus abdominis muscle	Separation (abdominal diastasis) commonly caused from multiple pregnancies, abdominal surgeries, and excessive weight gain; bleeding of inferior epigastric artery may cause blood to accumulate in rectus abdominis muscle (rectus sheath hematoma), which may be mistaken for acute abdominal pathologies, such as appendicitis	271
Cardiovascular System		
Paraumbilical veins	May become dilated in patients with portal hypertension and in late-term pregnancy	277, 318

ANATOMICAL STRUCTURE	CLINICAL COMMENT	PLATE NUMBERS
Cardiovascular System—Continued		
Cystic artery	Ligated during cholecystectomy; can have multiple origins; found classically in cystohepatic triangle (of Calot)	310
Superior mesenteric artery	May compress horizontal (third) part of duodenum in thin patient or patient who has recently lost a large amount of weight; can shear or tear in sudden deceleration injuries	310, 313
Intestinal arteries	Areas without significant collateral circulation between major vessels (watershed areas) are at risk for ischemia, which can occur secondary to atherosclerosis or thromboembolism of mesenteric arteries	313, 314
Marginal artery	Marginal artery connects right, middle, and left colic arteries, providing important anastomosis for collateral circulation	314
Esophageal veins	May become dilated in portal hypertension, resulting in esophageal varices; variceal hemorrhage can be life-threatening and often requires emergent endoscopic intervention	315, 318
Hepatic portal vein	Increased resistance to blood flow through liver (e.g., due to cirrhosis) may produce portal hypertension and dilation of tributaries of hepatic portal vein; blood may return to heart at sites of portosystemic anastomosis	317, 318
Superior anorectal (rectal) vein	Anastomoses with systemic middle and inferior anorectal veins may become dilated in portal hypertension	317, 318
Abdominal aorta	Common site for aneurysm in abdomen, especially inferior to renal arteries; assessed routinely with ultrasound to exclude aneurysms	336
Renal artery	Stenosis may occur secondary to atherosclerosis or fibromuscular dysplasia, resulting in difficult-to-control hypertension; can be affected in abdominal aortic aneurysms	334, 336
Lymph Vessels and Lymphoid Organs		
Spleen	May be ruptured by fracture of ribs 10 to 12; enlargement (splenomegaly) may occur in cirrhosis, viral infections, and hematologic malignancies; if palpable, the spleen is enlarged	291, 307
Digestive System		
Liver	Palpable inferior to right costal margin; hepatomegaly may occur in conditions such as hepatitis, heart failure, and infiltrative diseases; shrunken, nodular appearance of liver on imaging indicates cirrhosis; common site of metastasis	269, 288, 294
Gastroesophageal junction	Transient relaxations or decreased tone of lower esophageal sphincter can cause gastroesophageal reflux disease (GERD), a common cause of epigastric pain; common site of esophageal cancer	257, 295, 347
Stomach and duodenum	Primary sites of peptic ulcers; nonsteroidal anti-inflammatory drug (NSAID) overuse and/or *Helicobacter pylori* infection may cause ulceration	292, 294, 295
Pylorus	Infantile hypertrophic pyloric stenosis causes postprandial projectile vomiting among newborns	295
Major duodenal papilla (of Vater)	Catheterized and injected with contrast during endoscopic retrograde cholangiopancreatography (ERCP), a common diagnostic procedure; sphincter of hepatopancreatic ampulla (sphincter of Oddi) dysfunction may obstruct biliary flow through major duodenal papilla, resulting in right upper quadrant pain	297, 305
Vermiform appendix	Prone to inflammation and rupture (appendicitis); may have retrocecal position, in which case appendicitis causes inflammation of adjacent psoas fascia and atypical location of pain	298, 300
Colon	Common site of diverticula and malignancies; colonoscopy is performed to screen for colon cancer	301

ANATOMICAL STRUCTURE	CLINICAL COMMENT	PLATE NUMBERS
Gallbladder	May become inflamed (cholecystitis) and cause pain secondary to gallstones blocking cystic duct	302, 305, 308, 328
Bile duct	Gallstones may become impacted in bile duct (choledocholithiasis), resulting in hepatitis and jaundice; some cases may be complicated by pancreatitis and/or infection of obstructed biliary ducts (cholangitis); small stones can be problematic, whereas large stones usually remain in gallbladder and are more typically asymptomatic; ERCP is performed to locate and relieve obstruction	302, 303, 305
Umbilicus	Remnant of umbilical cord insertion into fetal umbilical vessels; landmark for locating transumbilical plane, which is used to divide abdomen into quadrants; marks position of T10 dermatome; used to locate McBurney's point; common site for hernias in abdominal wall	267, 269
Pancreas	Lies primarily retroperitoneal and deep to stomach; thus, inflamed pancreas may be compressed by stomach and cause intense pain referred to the back; inflamed pancreas, most often caused by biliary obstruction or alcohol abuse, may cause severe life-threatening complications; cancer of head/neck of pancreas can compress biliary tree	292, 306, 329
Urinary System		
Kidney	Right kidney is lower or more inferior than left kidney due to position inferior to liver; renal arteries are generally located at L2 vertebral level and may be involved in abdominal aortic aneurysms; renal calculi (kidney stones) cause significant pain when impacted in ureter	333
Renal pelvis	May become dilated secondary to ureteral or urinary bladder outlet obstruction, a condition known as hydronephrosis, which is readily visualized using ultrasound	333
Endocrine System		
Suprarenal gland	Produces hormones in its cortex (e.g., cortisol, aldosterone) and medulla (e.g., epinephrine, norepinephrine); small masses are frequently incidentally discovered on axial abdominal imaging; need for further workup depends in part on size	330

*Selections were based largely on clinical data and commonly discussed clinical correlations in macroscopic ("gross") anatomy courses.

MUSCLE	MUSCLE GROUP	ORIGIN ATTACHMENT	INSERTION ATTACHMENT	INNERVATION	BLOOD SUPPLY	MAIN ACTIONS
External abdominal oblique m.	Anterior abdominal wall	External surfaces of ribs 5–12	Linea alba, pubic tubercle, anterior half of iliac crest	Anterior rami of T7–T12 spinal nerves	Superior and inferior epigastric, and lumbar arteries	Compresses and supports abdominal viscera, flexes and rotates trunk
Internal abdominal oblique m.	Anterior abdominal wall	Thoracolumbar fascia, anterior two-thirds of iliac crest	Inferior borders of ribs 10–12, linea alba (via rectus sheath), pubic crest and pecten pubis (via inguinal falx)	Anterior rami of T7–L1 spinal nerves	Superior and inferior epigastric, deep circumflex iliac, and lumbar arteries	Compresses and supports abdominal viscera, flexes and rotates trunk
Pyramidalis m.	Anterior abdominal wall	Body of pubis and pubic symphysis (anterior to rectus abdominis)	Linea alba (inferior to umbilicus)	Anterior ramus of T12 spinal nerve via subcostal or iliohypogastric nerves	Inferior epigastric artery	Tenses linea alba
Quadratus lumborum m.	Posterior abdominal wall	Medial half of inferior border of 12th rib, tips of transverse processes of L1–L4 vertebrae	Internal lip of iliac crest, iliolumbar ligament	Anterior rami of T12–L1 spinal nerves	Iliolumbar artery	Extends and laterally flexes vertebral column, fixes 12th rib during inspiration
Rectus abdominis m.	Anterior abdominal wall	Pubic crest, pubic symphysis	Costal cartilages 5–7, xiphoid process	Anterior rami of T7–T12 spinal nerves	Superior and inferior epigastric arteries	Flexes trunk, compresses abdominal viscera
Transversus abdominis m.	Anterior abdominal wall	Internal surfaces of costal cartilages 7–12, thoracolumbar fascia, iliac crest	Linea alba (via rectus sheath), pubic crest and pecten pubis (via inguinal falx)	Anterior rami of T7–L1 spinal nerves	Deep circumflex iliac, inferior epigastric, and lumbar arteries	Compresses and supports abdominal viscera

Variations in spinal nerve contributions to the innervation of muscles, their arterial supply, their attachments, and their actions are common themes in human anatomy. Therefore, expect differences between texts and realize that anatomical variation is normal.

PELVIS 6

Surface Anatomy	352
Bony Pelvis	353–357
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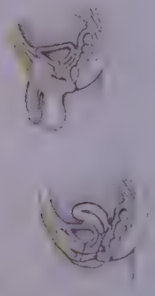
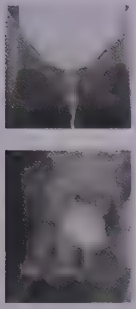
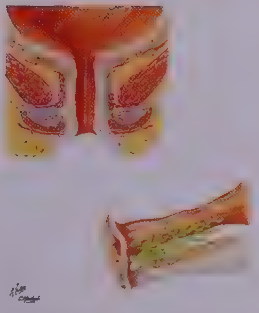
ELECTRONIC BONUS PLATES



BP 84 Fasciae of Pelvis and Perineum: Male and Female



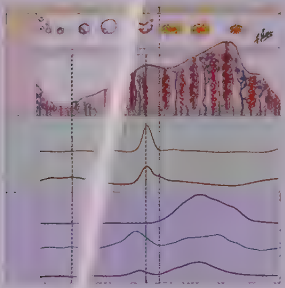
BP 85 Cystourethrograms: Male and Female

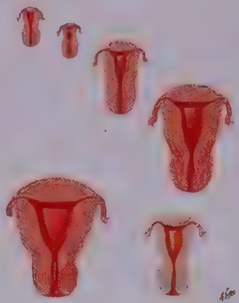


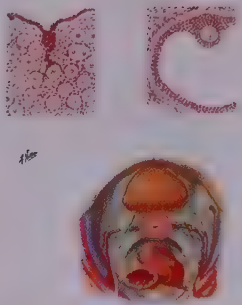
BP 86 Female Urethra

BP 87 Genetics of Reproduction

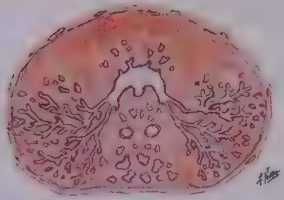
ELECTRONIC BONUS PLATES—*cont'd*

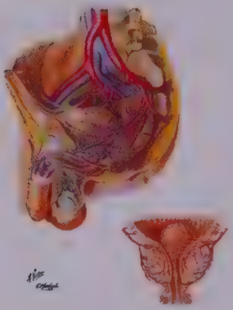

BP 88 Menstrual Cycle


BP 89 Uterine Development

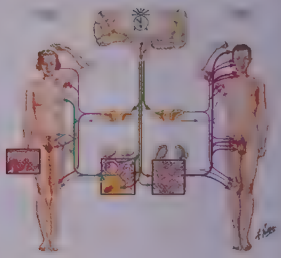

BP 90 Ovary, Oocytes, and Follicles

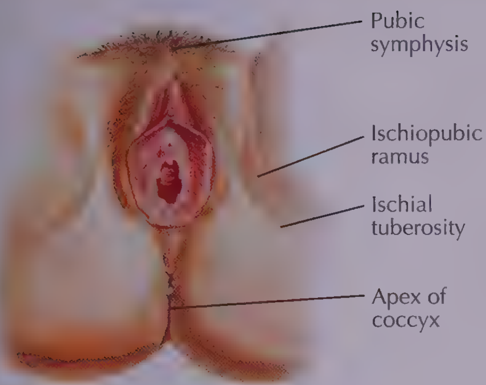
BP 91 Variations in Hymen

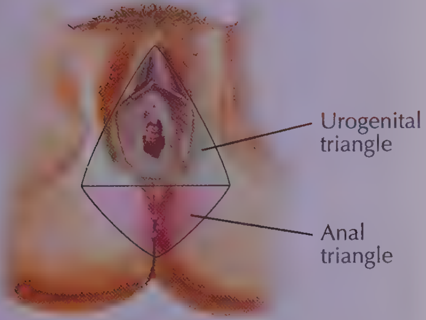

BP 92 Cross Section of Pelvis Through Prostate

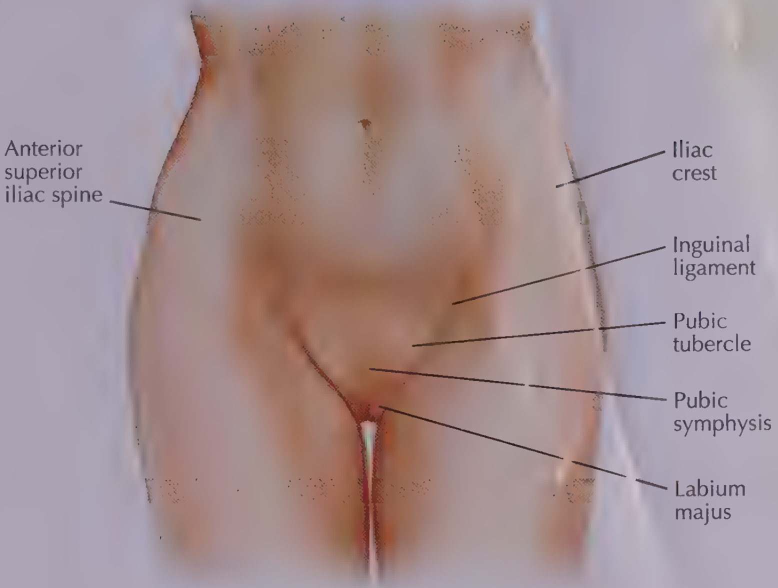

BP 93 Arteries and Veins of Pelvis: Male (Featuring Prostate)

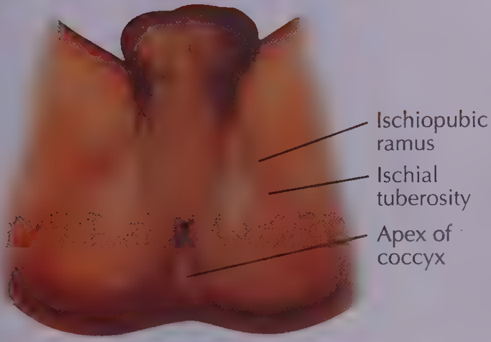
BP 94 Cross Section of Pelvis Through Vesicoprostatic Junction

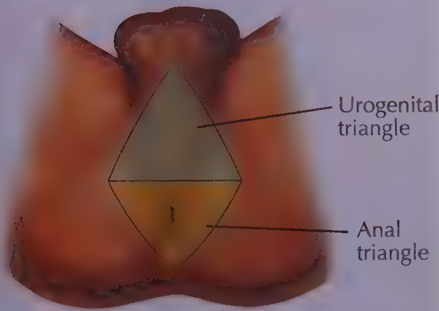

BP 95 Endocrine Glands, Hormones, and Puberty

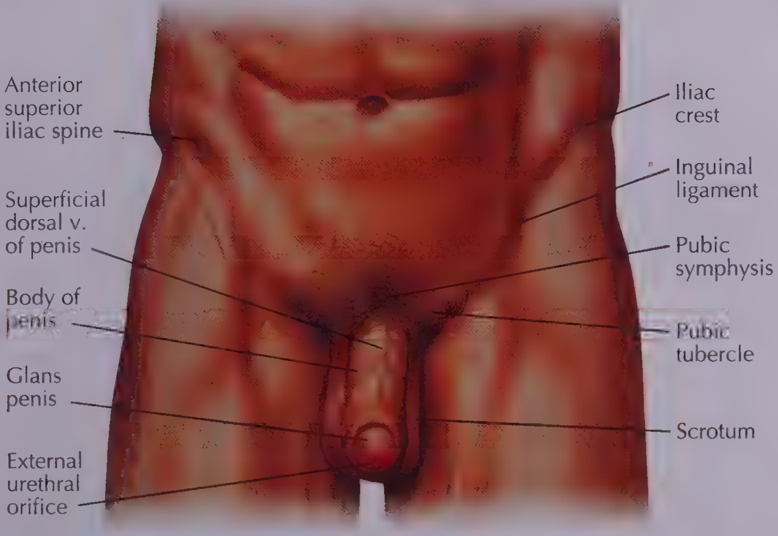

Pubic symphysis
Ischiopubic ramus
Ischial tuberosity
Apex of coccyx


Urogenital triangle
Anal triangle

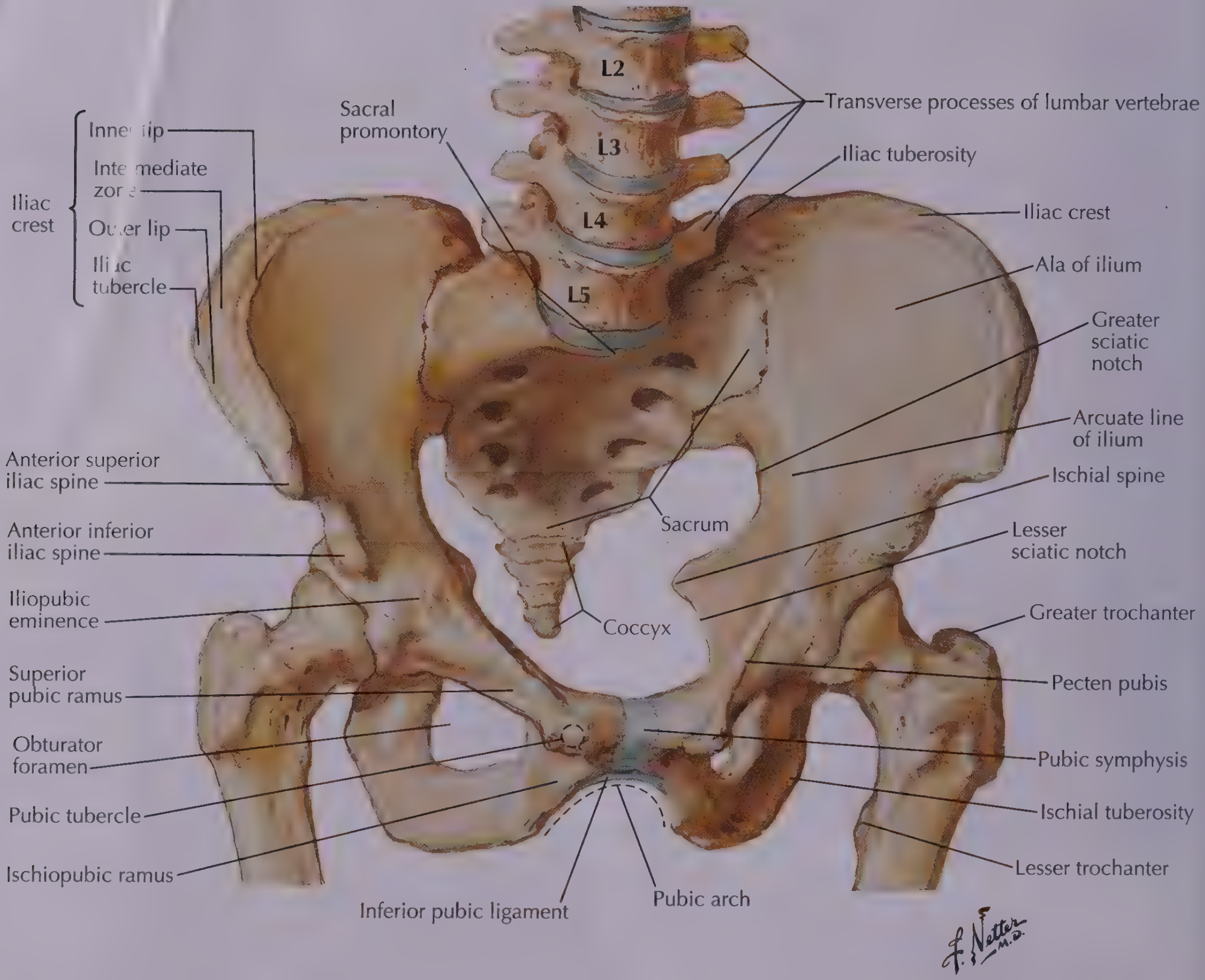

Anterior superior iliac spine
Iliac crest
Inguinal ligament
Pubic tubercle
Pubic symphysis
Labium majus


Ischiopubic ramus
Ischial tuberosity
Apex of coccyx

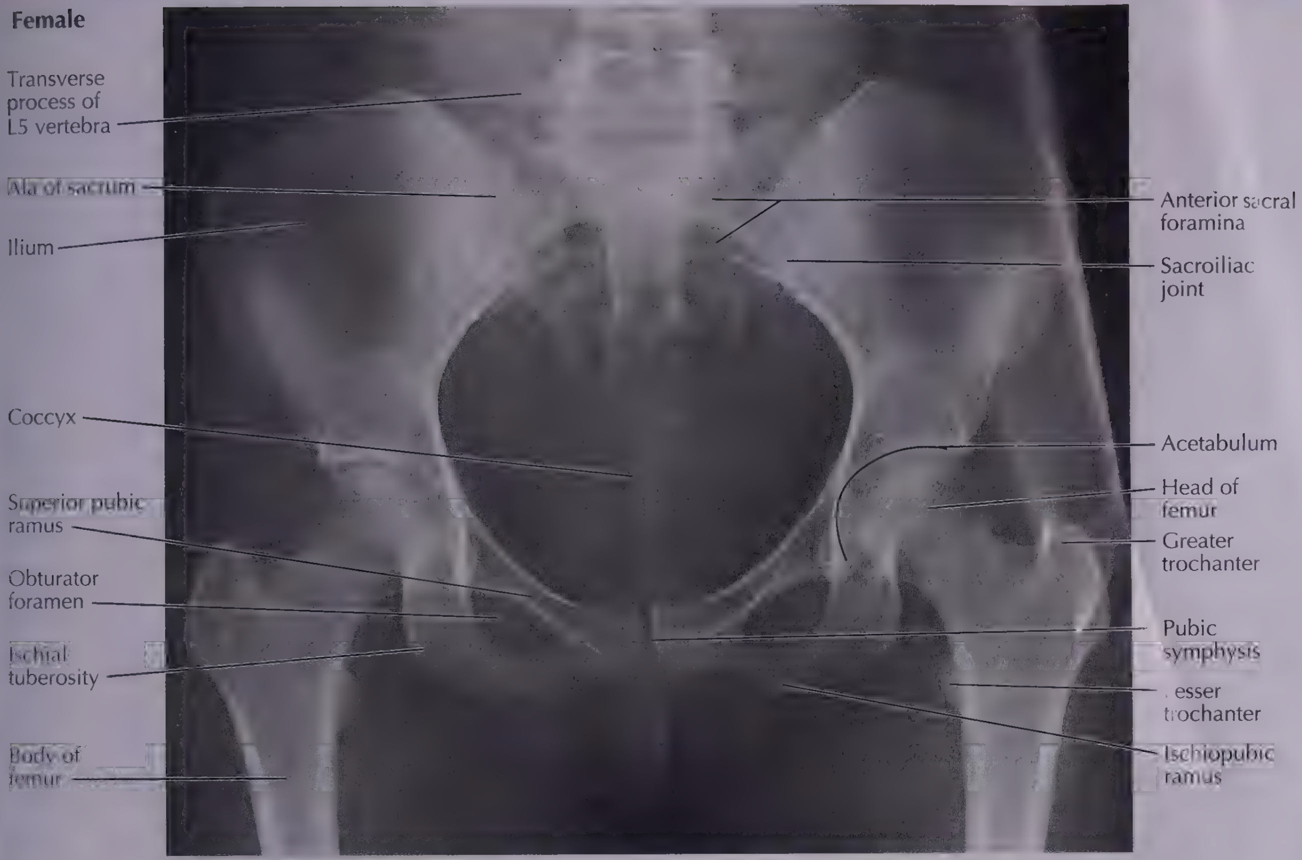

Urogenital triangle
Anal triangle


Anterior superior iliac spine
Superficial dorsal v. of penis
Body of penis
Glans penis
External urethral orifice
Iliac crest
Inguinal ligament
Pubic symphysis
Pubic tubercle
Scrotum

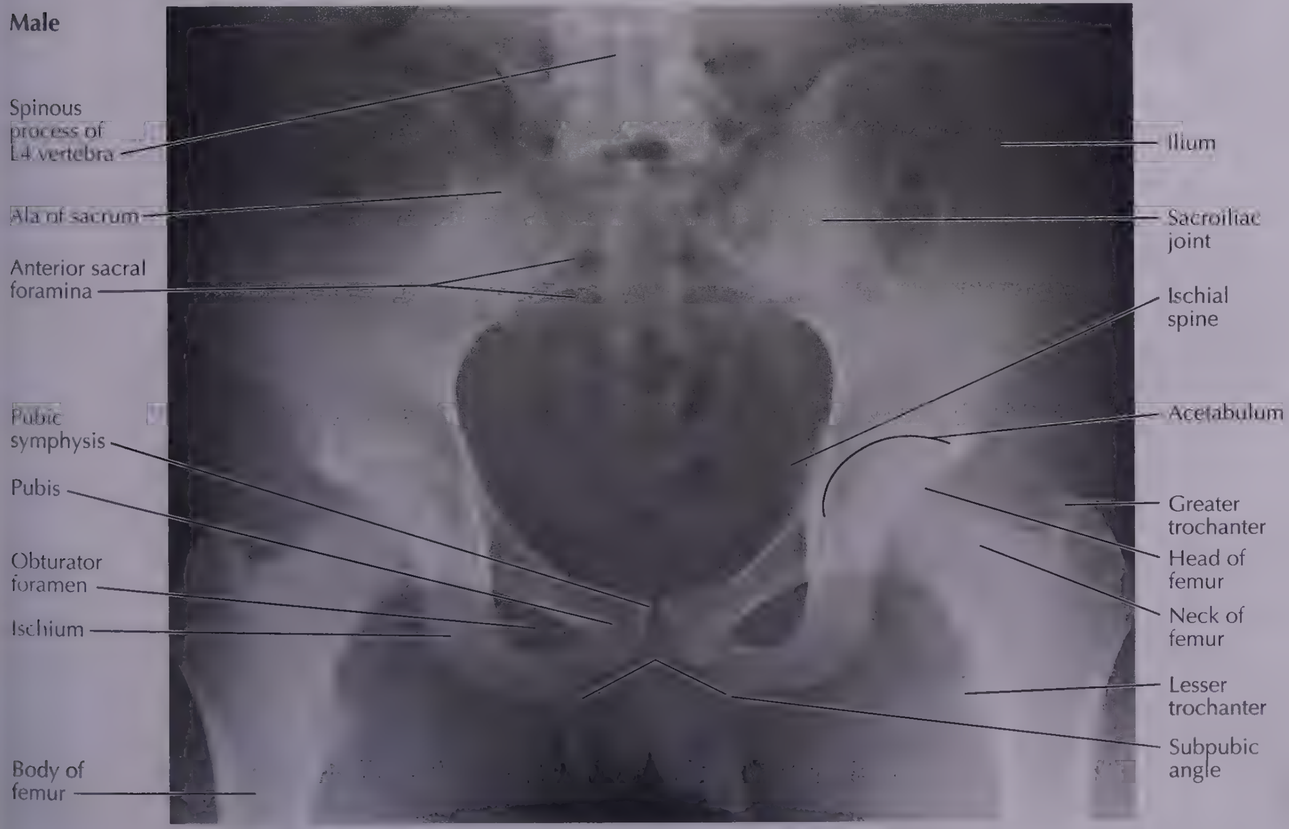
F. Netter M.D. C. Machado M.D.


L2
L3
L4
L5
Transverse processes of lumbar vertebrae
Sacral promontory
Iliac crest
Inner lip
Intermediate zone
Outer lip
Iliac tubercle
Iliac tuberosity
Iliac crest
Ala of ilium
Greater sciatic notch
Arcuate line of ilium
Anterior superior iliac spine
Ischial spine
Anterior inferior iliac spine
Sacrum
Lesser sciatic notch
Iliopubic eminence
Coccyx
Greater trochanter
Superior pubic ramus
Pecten pubis
Obturator foramen
Pubic symphysis
Pubic tubercle
Ischial tuberosity
Ischiopubic ramus
Lesser trochanter
Inferior pubic ligament
Pubic arch
F. Netter M.D.

Female


Transverse process of L5 vertebra
Ala of sacrum
Ilium
Coccyx
Superior pubic ramus
Obturator foramen
Ischial tuberosity
Body of femur
Anterior sacral foramina
Sacroiliac joint
Acetabulum
Head of femur
Greater trochanter
Pubic symphysis
Lesser trochanter
Ischiopubic ramus

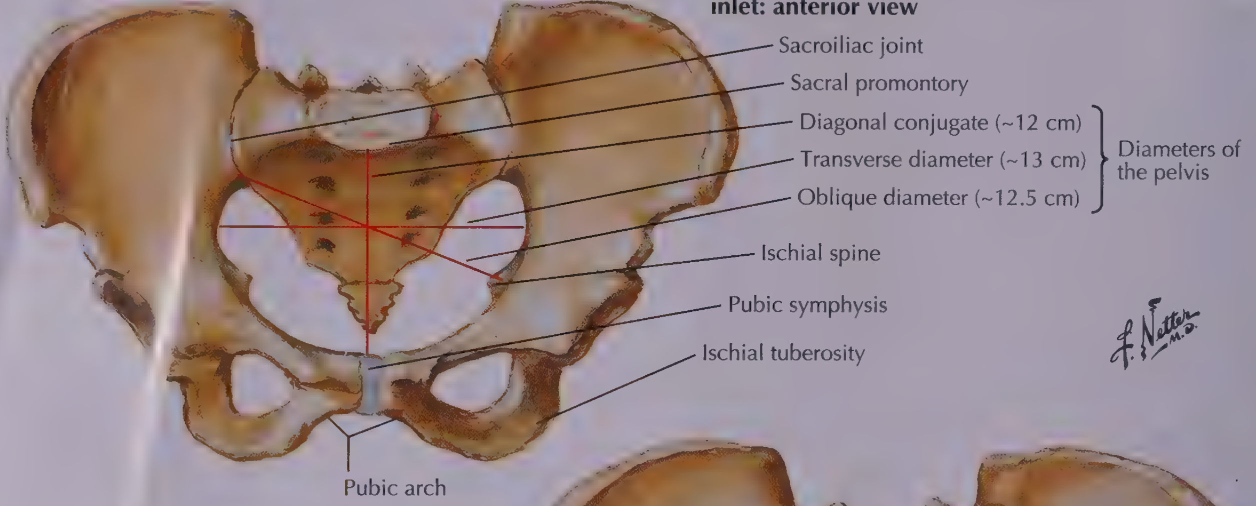
Male


Spinous process of L4 vertebra
Ala of sacrum
Anterior sacral foramina
Pubic symphysis
Pubis
Obturator foramen
Ischium
Body of femur
Ilium
Sacroiliac joint
Ischial spine
Acetabulum
Greater trochanter
Head of femur
Neck of femur
Lesser trochanter
Subpubic angle

Sex Differences of Bony Pelvis: Measurements

See also Plate 268

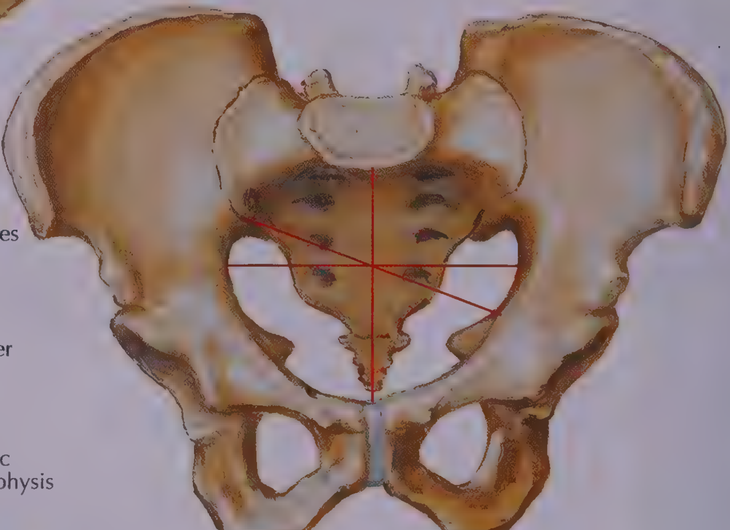
Female bony pelvis/female pelvic inlet: anterior view

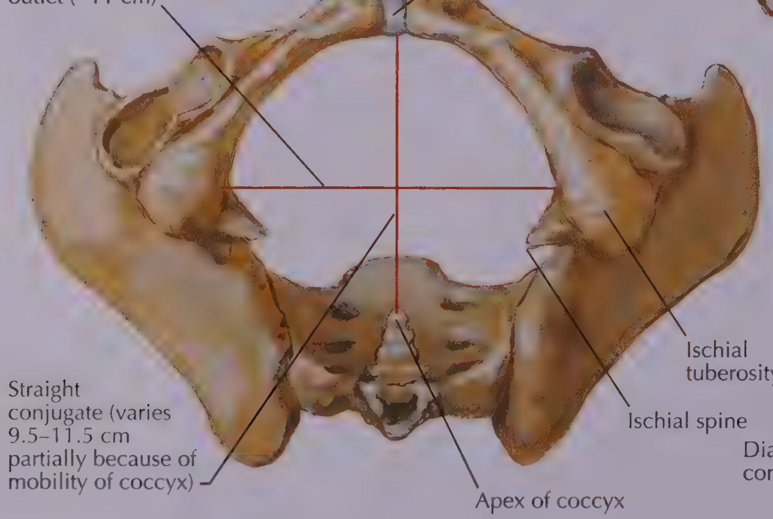

Sacroiliac joint
Sacral promontory
Diagonal conjugate (~12 cm)
Transverse diameter (~13 cm)
Oblique diameter (~12.5 cm)
Diameters of the pelvis
Ischial spine
Pubic symphysis
Ischial tuberosity
Pubic arch

Male bony pelvis/male pelvic inlet: anterior view

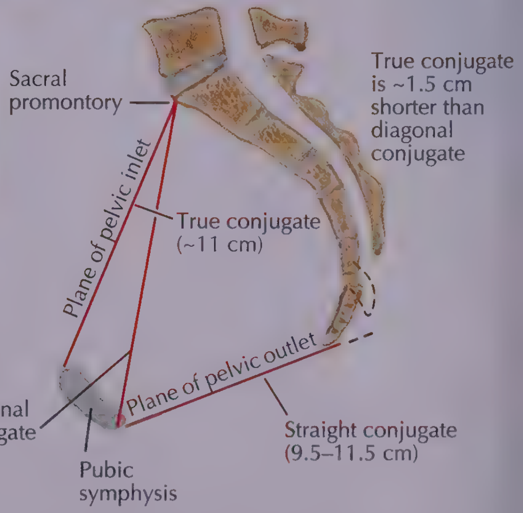
Diagonal conjugate is only diameter of pelvic inlet (superior pelvic aperture) that can be measured clinically

All measurements slightly shorter in relation to body size than in females
Pelvic inlet oriented more anteroposteriorly than in females, where it tends to be transversely oval
Pubic symphysis deeper (longer)
Pubic arch (subpubic angle) narrower
Ischial tuberosities less far apart
Iliac alae less flared




Transverse diameter of pelvic outlet (~11 cm)
Pubic symphysis
Ischial tuberosity
Ischial spine
Straight conjugate (varies 9.5–11.5 cm partially because of mobility of coccyx)
Apex of coccyx

Female bony pelvis/female pelvic outlet: inferior view

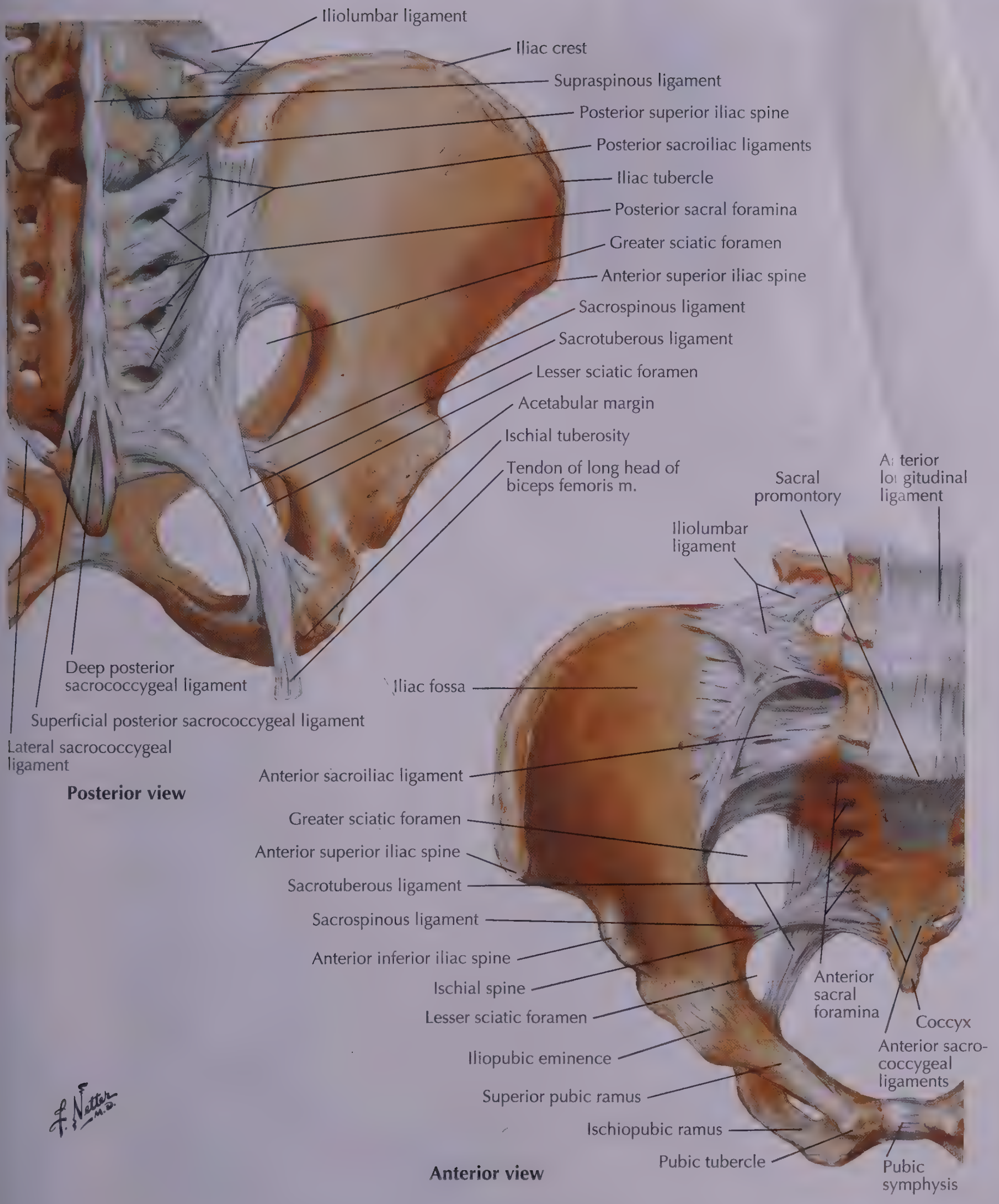

Sacral promontory
True conjugate is ~1.5 cm shorter than diagonal conjugate
Plane of pelvic inlet
True conjugate (~11 cm)
Plane of pelvic outlet
Diagonal conjugate
Straight conjugate (9.5–11.5 cm)
Pubic symphysis

Transverse diameter is the widest distance of pelvic inlet

Female: sagittal section

Ligaments of Bony Pelvis

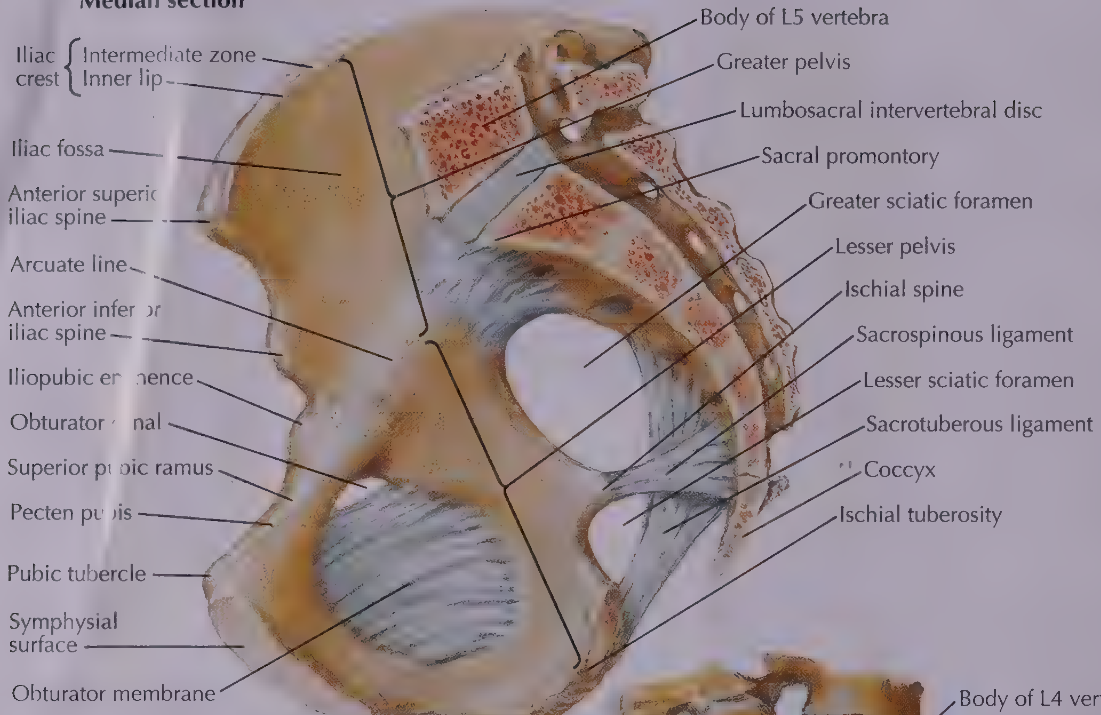
See also Plate 184


Iliolumbar ligament
Iliac crest
Supraspinous ligament
Posterior superior iliac spine
Posterior sacroiliac ligaments
Iliac tubercle
Posterior sacral foramina
Greater sciatic foramen
Anterior superior iliac spine
Sacrospinous ligament
Sacrotuberous ligament
Lesser sciatic foramen
Acetabular margin
Ischial tuberosity
Tendon of long head of biceps femoris m.
Deep posterior sacrococcygeal ligament
Superficial posterior sacrococcygeal ligament
Lateral sacrococcygeal ligament
Posterior view
Sacral promontory
Anterior longitudinal ligament
Iliolumbar ligament
Iliac fossa
Anterior sacroiliac ligament
Greater sciatic foramen
Anterior superior iliac spine
Sacrotuberous ligament
Sacrospinous ligament
Anterior inferior iliac spine
Ischial spine
Lesser sciatic foramen
Iliopubic eminence
Superior pubic ramus
Ischiopubic ramus
Pubic tubercle
Anterior sacral foramina
Coccyx
Anterior sacrococcygeal ligaments
Pubic symphysis
Anterior view
F. Netter M.D.

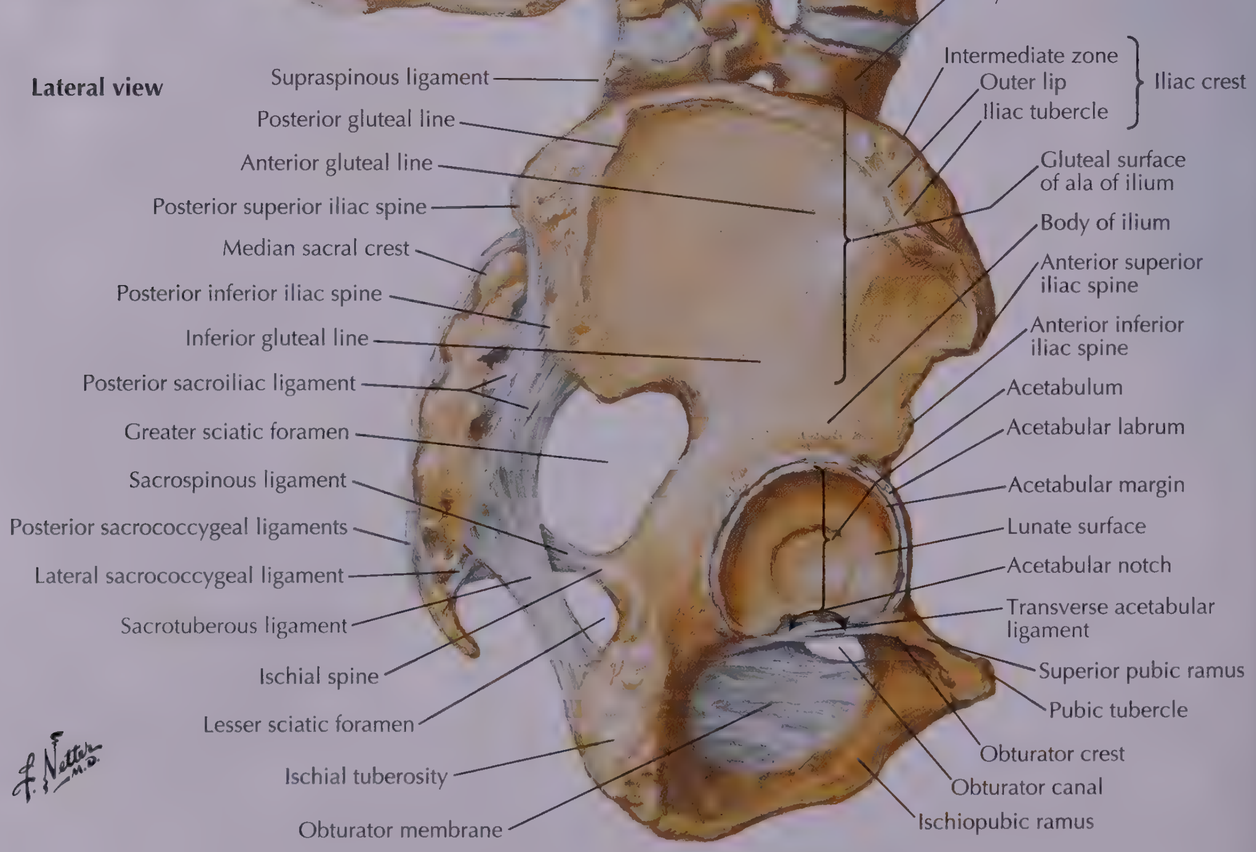
Ligaments of Hip Bone

See also Plate 184

Median section


Iliac crest
Intermediate zone
Inner lip
Iliac fossa
Anterior superior iliac spine
Arcuate line
Anterior inferior iliac spine
Iliopubic eminence
Obturator canal
Superior pubic ramus
Pecten pubis
Pubic tubercle
Symphysial surface
Obturator membrane
Body of L5 vertebra
Greater pelvis
Lumbosacral intervertebral disc
Sacral promontory
Greater sciatic foramen
Lesser pelvis
Ischial spine
Sacrospinous ligament
Lesser sciatic foramen
Sacrotuberous ligament
Coccyx
Ischial tuberosity

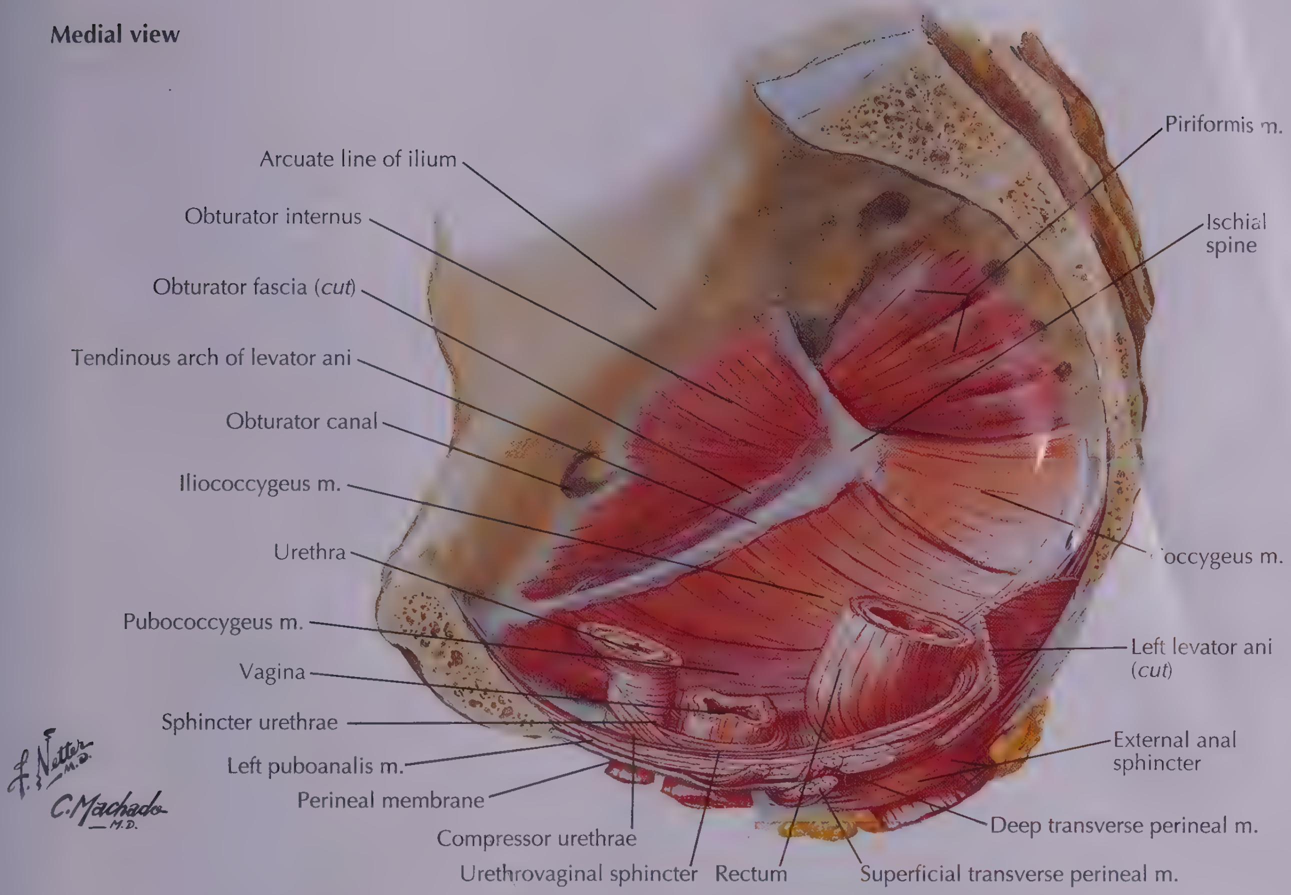
Lateral view


Supraspinous ligament
Posterior gluteal line
Anterior gluteal line
Posterior superior iliac spine
Median sacral crest
Posterior inferior iliac spine
Inferior gluteal line
Posterior sacroiliac ligament
Greater sciatic foramen
Sacrospinous ligament
Posterior sacrococcygeal ligaments
Lateral sacrococcygeal ligament
Sacrotuberous ligament
Ischial spine
Lesser sciatic foramen
Ischial tuberosity
Obturator membrane
Body of L4 vertebra
Intermediate zone
Outer lip
Iliac tubercle
Iliac crest
Gluteal surface of ala of ilium
Body of ilium
Anterior superior iliac spine
Anterior inferior iliac spine
Acetabulum
Acetabular labrum
Acetabular margin
Lunate surface
Acetabular notch
Transverse acetabular ligament
Superior pubic ramus
Pubic tubercle
Obturator crest
Obturator canal
Ischiopubic ramus
F. Netter M.D.

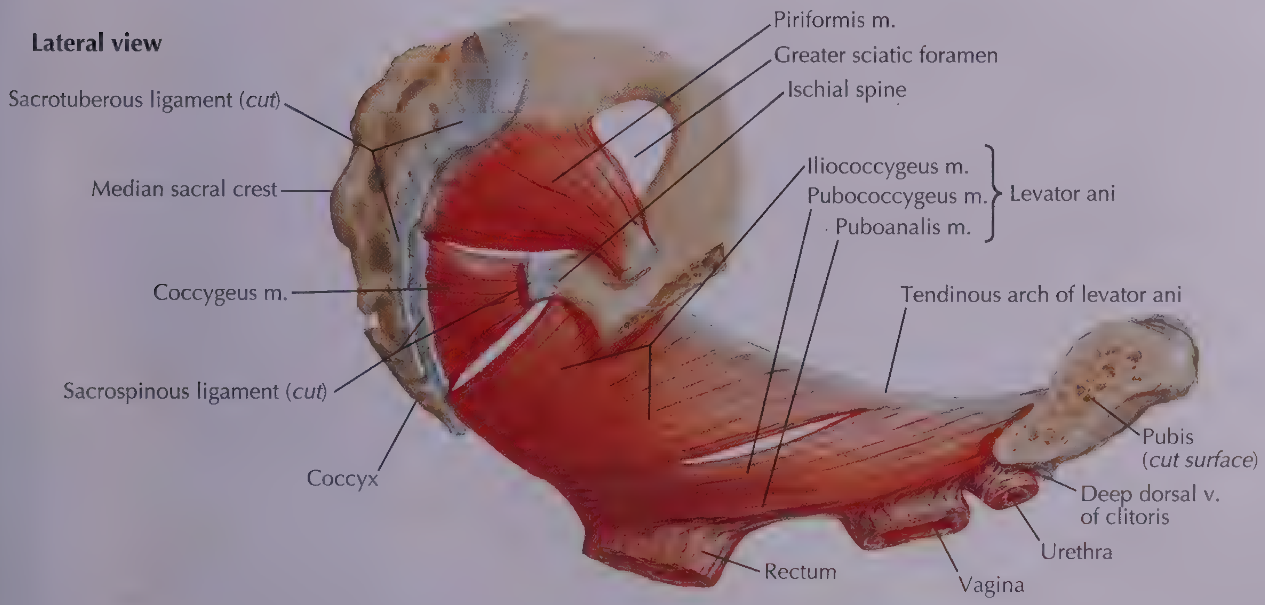
Pelvic Diaphragm: Female

See also Plate [illegible]

Medial view


Arcuate line of ilium
Obturator internus
Obturator fascia (*cut*)
Tendinous arch of levator ani
Obturator canal
Iliococcygeus m.
Urethra
Pubococcygeus m.
Vagina
Sphincter urethrae
Left puboanalis m.
Perineal membrane
Compressor urethrae
Urethrovaginal sphincter
Rectum
Superficial transverse perineal m.
Deep transverse perineal m.
External anal sphincter
Left levator ani (*cut*)
Coccygeus m.
Ischial spine
Piriformis m.
F. Netter M.D.
C. Machado M.D.

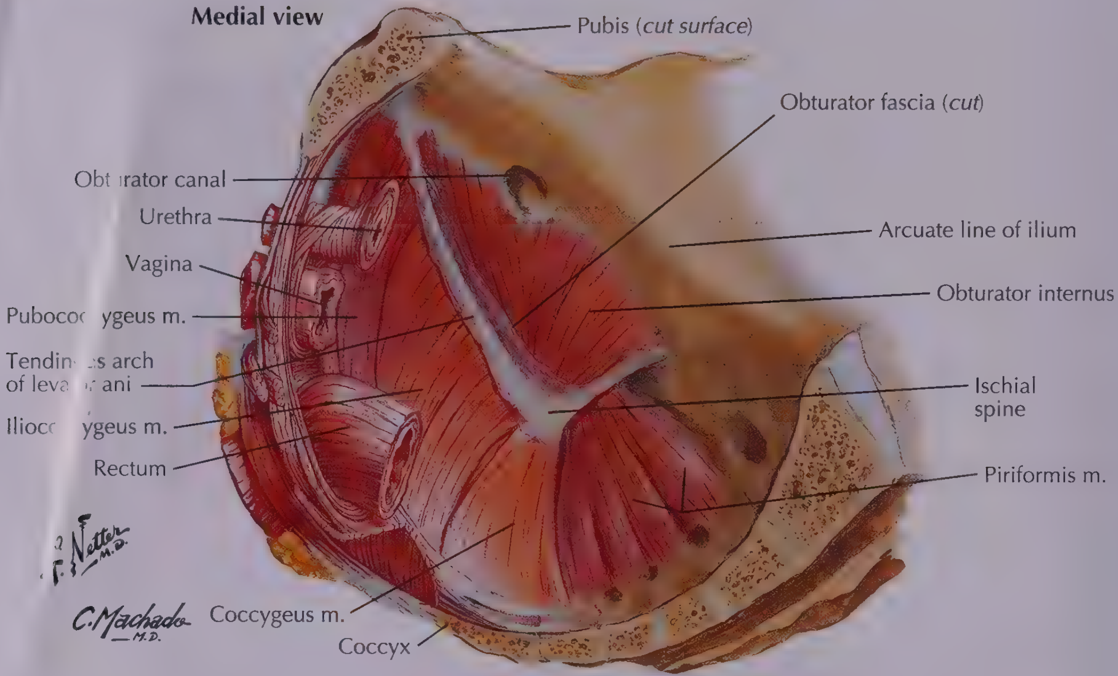
Lateral view


Sacrotuberous ligament (*cut*)
Median sacral crest
Coccygeus m.
Sacrospinous ligament (*cut*)
Coccyx
Piriformis m.
Greater sciatic foramen
Ischial spine
Iliococcygeus m.
Pubococcygeus m.
Puboanalis m.
Levator ani
Tendinous arch of levator ani
Pubis (*cut surface*)
Deep dorsal v. of clitoris
Urethra
Vagina
Rectum

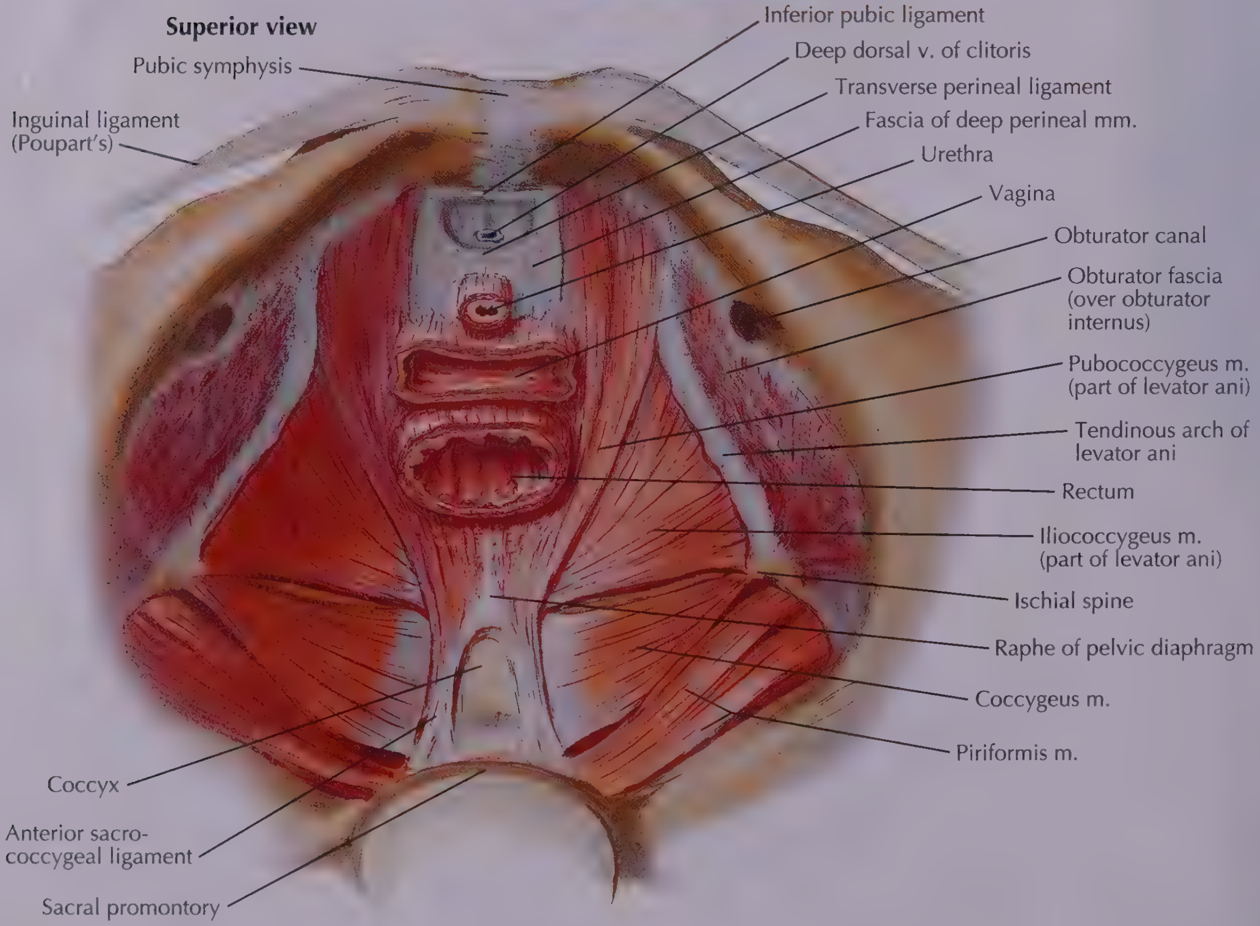
Pelvic Diaphragm (Female): Medial and Superior Views

See also Plate 379

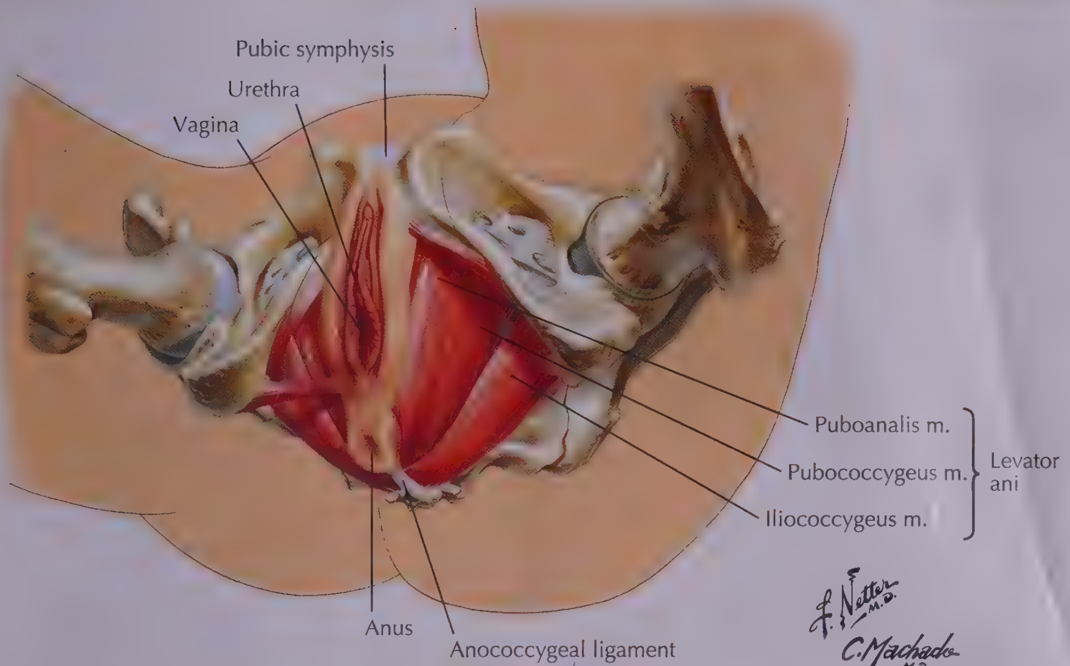
Medial view


Pubis (*cut surface*)
Obturator fascia (*cut*)
Obturator canal
Urethra
Arcuate line of ilium
Vagina
Obturator internus
Pubococcygeus m.
Tendinous arch of levator ani
Ischial spine
Iliococcygeus m.
Rectum
Piriformis m.
Coccygeus m.
Coccyx

Superior view


Inferior pubic ligament
Pubic symphysis
Deep dorsal v. of clitoris
Transverse perineal ligament
Inguinal ligament (Poupart's)
Fascia of deep perineal mm.
Urethra
Vagina
Obturator canal
Obturator fascia (over obturator internus)
Pubococcygeus m. (part of levator ani)
Tendinous arch of levator ani
Rectum
Iliococcygeus m. (part of levator ani)
Ischial spine
Raphe of pelvic diaphragm
Coccygeus m.
Piriformis m.
Coccyx
Anterior sacro-coccygeal ligament
Sacral promontory

See also Plate 380


Pubic symphysis
Urethra
Vagina
Puboanalis m.
Pubococcygeus m.
Iliococcygeus m.
Levator ani
Anus
Anococcygeal ligament

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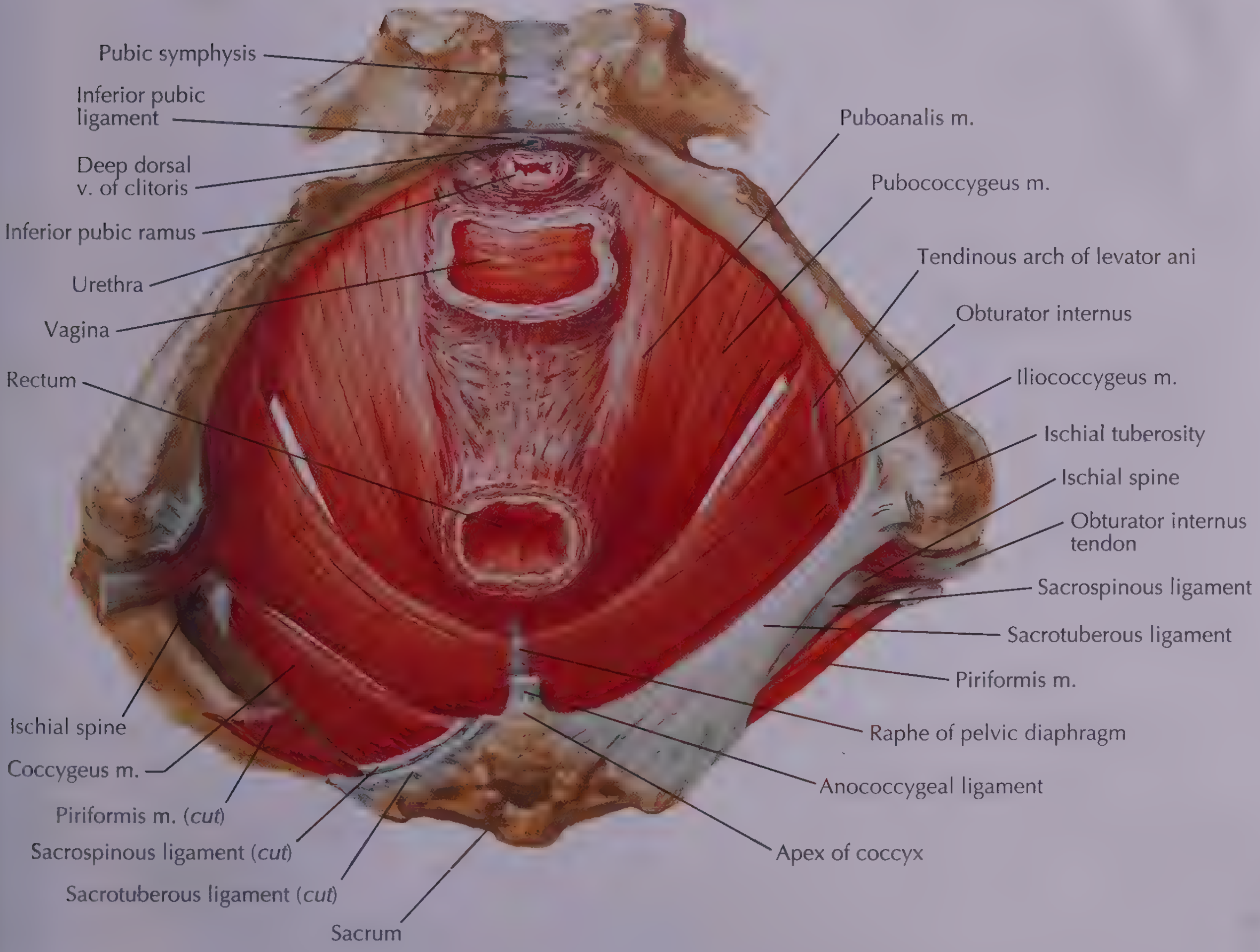
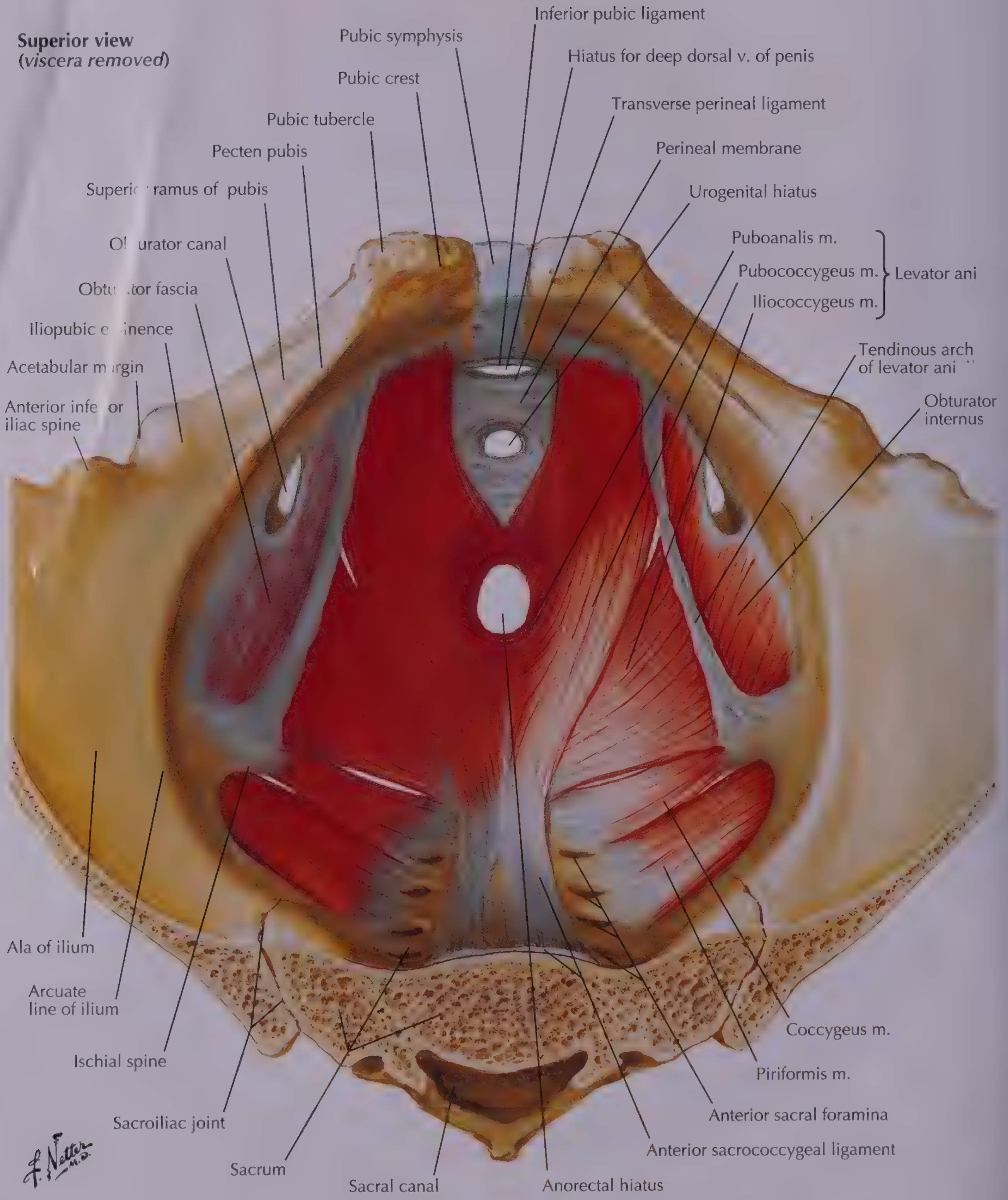
C. Machado M.D.

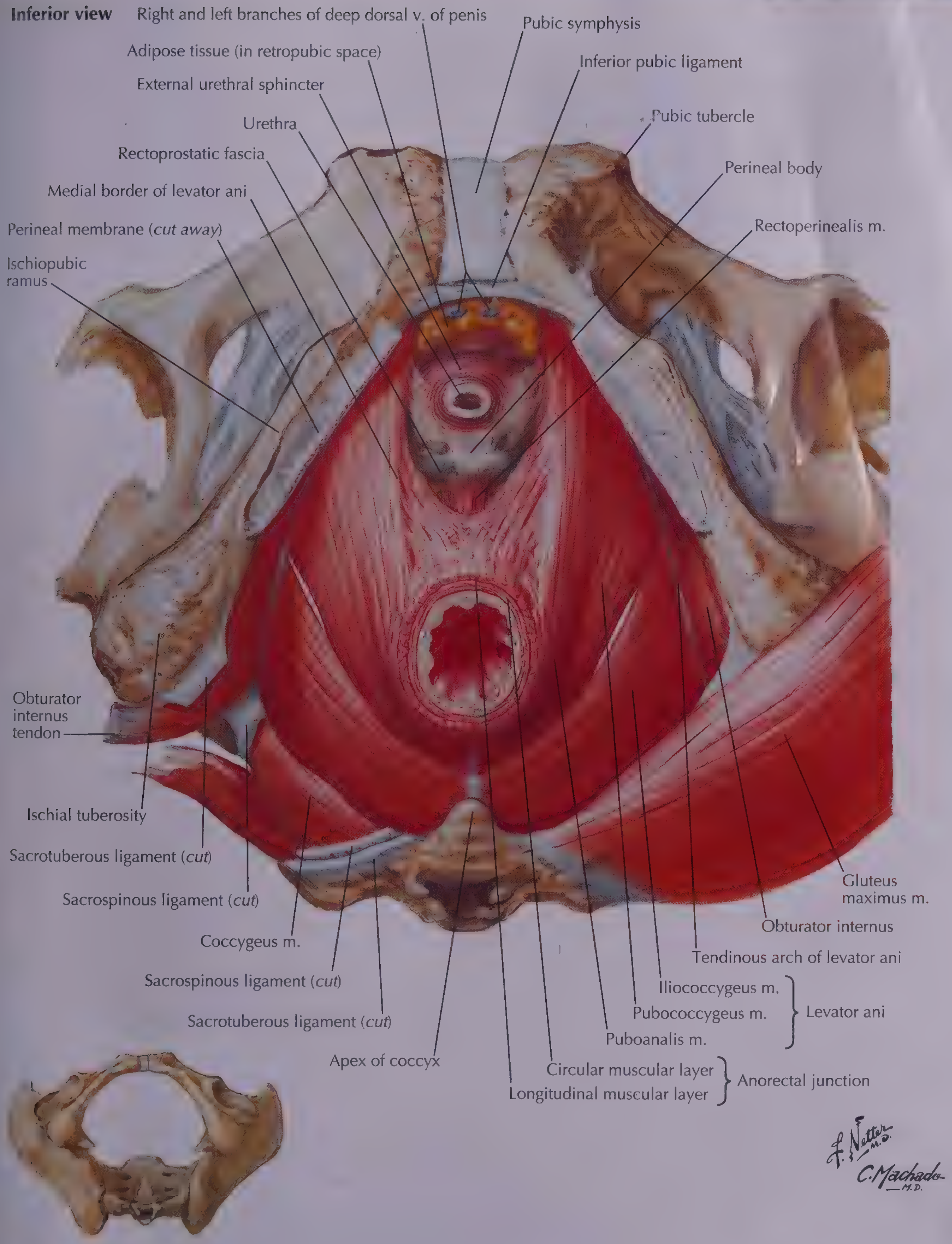
Inferior view


Pubic symphysis
Inferior pubic ligament
Deep dorsal v. of clitoris
Inferior pubic ramus
Urethra
Vagina
Rectum
Ischial spine
Coccygeus m.
Piriformis m. (cut)
Sacrospinous ligament (cut)
Sacrotuberous ligament (cut)
Sacrum
Puboanalis m.
Pubococcygeus m.
Tendinous arch of levator ani
Obturator internus
Iliococcygeus m.
Ischial tuberosity
Ischial spine
Obturator internus tendon
Sacrospinous ligament
Sacrotuberous ligament
Piriformis m.
Raphe of pelvic diaphragm
Anococcygeal ligament
Apex of coccyx

Pelvic Diaphragm (Male): Superior View

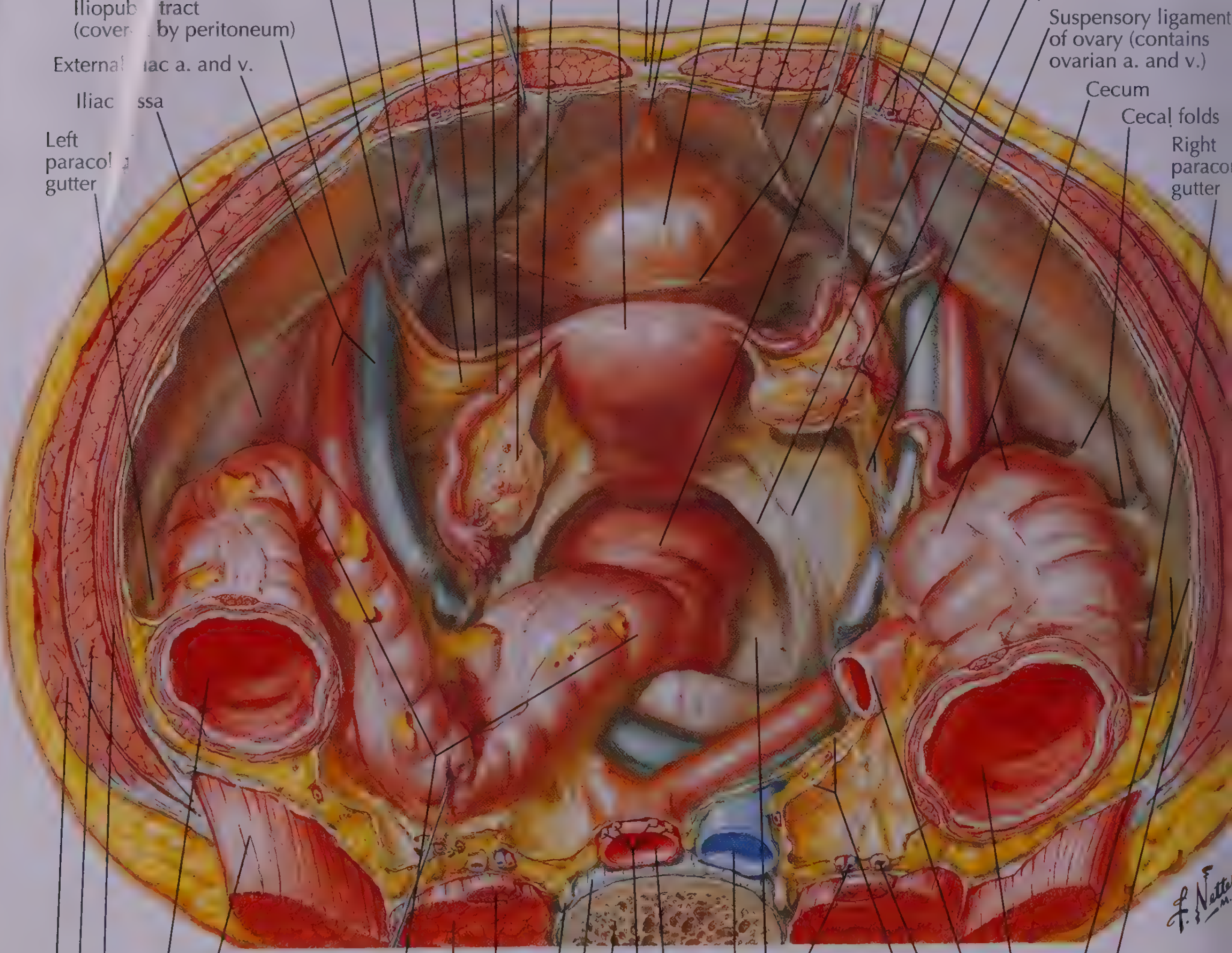
See also Plate 362


Superior view
(viscera removed)
Pubic symphysis
Inferior pubic ligament
Hiatus for deep dorsal v. of penis
Pubic crest
Transverse perineal ligament
Pubic tubercle
Perineal membrane
Pecten pubis
Urogenital hiatus
Superior ramus of pubis
Obturator canal
Puboanalis m.
Pubococcygeus m.
Iliococcygeus m.
Levator ani
Obturator fascia
Iliopubic eminence
Acetabular margin
Tendinous arch of levator ani
Anterior inferior iliac spine
Obturator internus
Ala of ilium
Arcuate line of ilium
Ischial spine
Coccygeus m.
Piriformis m.
Anterior sacral foramina
Sacroiliac joint
Anterior sacrococcygeal ligament
Sacrum
Sacral canal
Anorectal hiatus

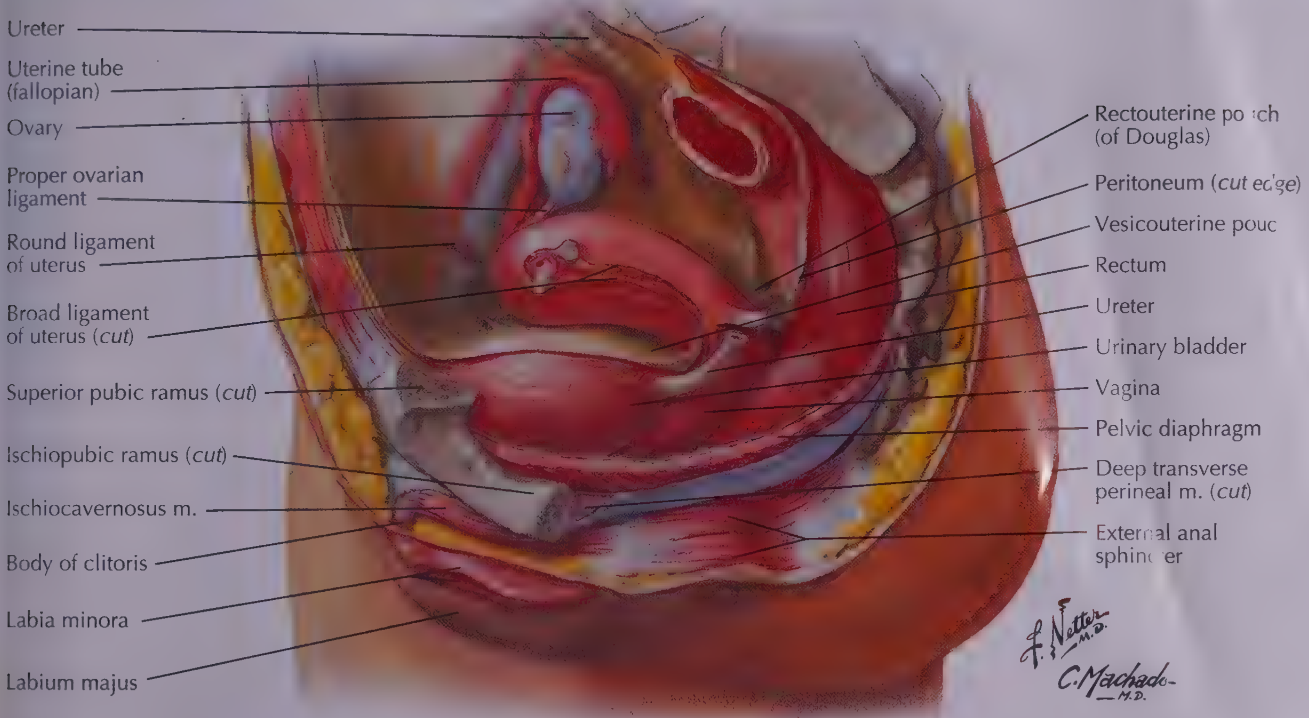

Inferior view
Right and left branches of deep dorsal v. of penis
Adipose tissue (in retropubic space)
External urethral sphincter
Urethra
Rectoprostatic fascia
Medial border of levator ani
Perineal membrane (*cut away*)
Ischiopubic ramus
Pubic symphysis
Inferior pubic ligament
Pubic tubercle
Perineal body
Rectoperinealis m.
Obturator internus tendon
Ischial tuberosity
Sacrotuberous ligament (*cut*)
Sacrospinous ligament (*cut*)
Coccygeus m.
Sacrospinous ligament (*cut*)
Sacrotuberous ligament (*cut*)
Apex of coccyx
Gluteus maximus m.
Obturator internus
Tendinous arch of levator ani
Iliococcygeus m.
Pubococcygeus m.
Puboanalis m.
Levator ani
Circular muscular layer
Longitudinal muscular layer
Anorectal junction
F. Netter M.D.
C. Machado M.D.

Pelvic Cavity: Female

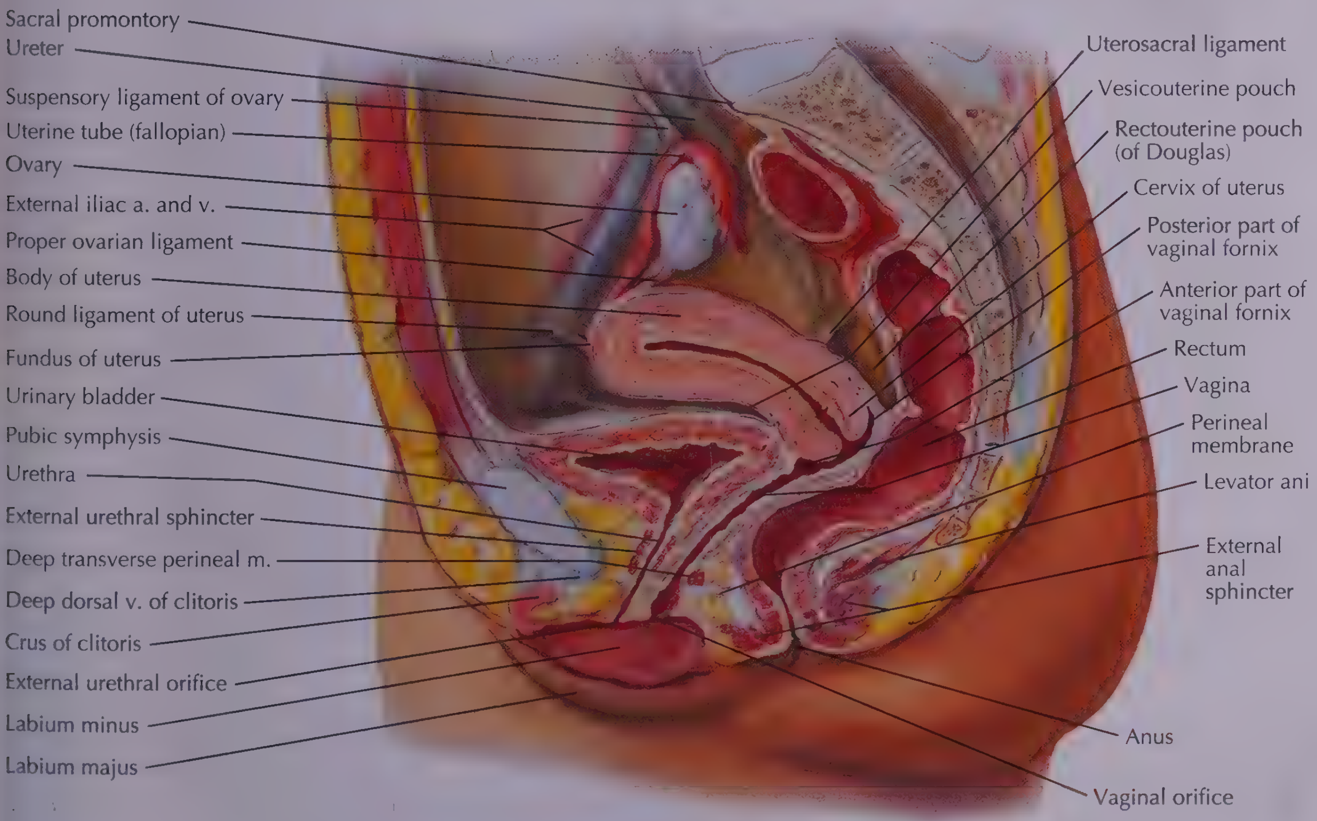
Superior view


Median umbilical ligament
Linea alba
Fundus of uterus
Proper ovarian ligament
Ovary
Uterine tube (fallopian)
Round ligament of uterus
Broad ligament of uterus
Femoral ring
Deep inguinal ring
Iliopubic tract (covered by peritoneum)
External iliac a. and v.
Iliac fossa
Left paracolic gutter
Median umbilical fold
Urinary bladder
Rectus abdominis m.
Medial umbilical ligament
Medial umbilical fold
Transverse vesical fold
Rectum
Inferior epigastric a. and v.
Lateral umbilical fold
Rectouterine fold
Ureter (covered by peritoneum)
Suspensory ligament of ovary (contains ovarian a. and v.)
Cecum
Cecal folds
Right paraco gutter
Sigmoid colon
Quadratus lumborum m.
Psoas major
Psoas minor
Descending colon
Transversus abdominis m.
Sympathetic trunk
Internal abdominal oblique m.
Anterior longitudinal ligament
External abdominal oblique m.
Body of L3 vertebra
Ovarian a. and v.
Pararectal fossa
Inferior vena cava
Abdominal aorta
Superior hypogastric plexus
Transversalis fascia
Parietal peritoneum
Ascending colon
Terminal ileum
Ureter
Root of mesentery

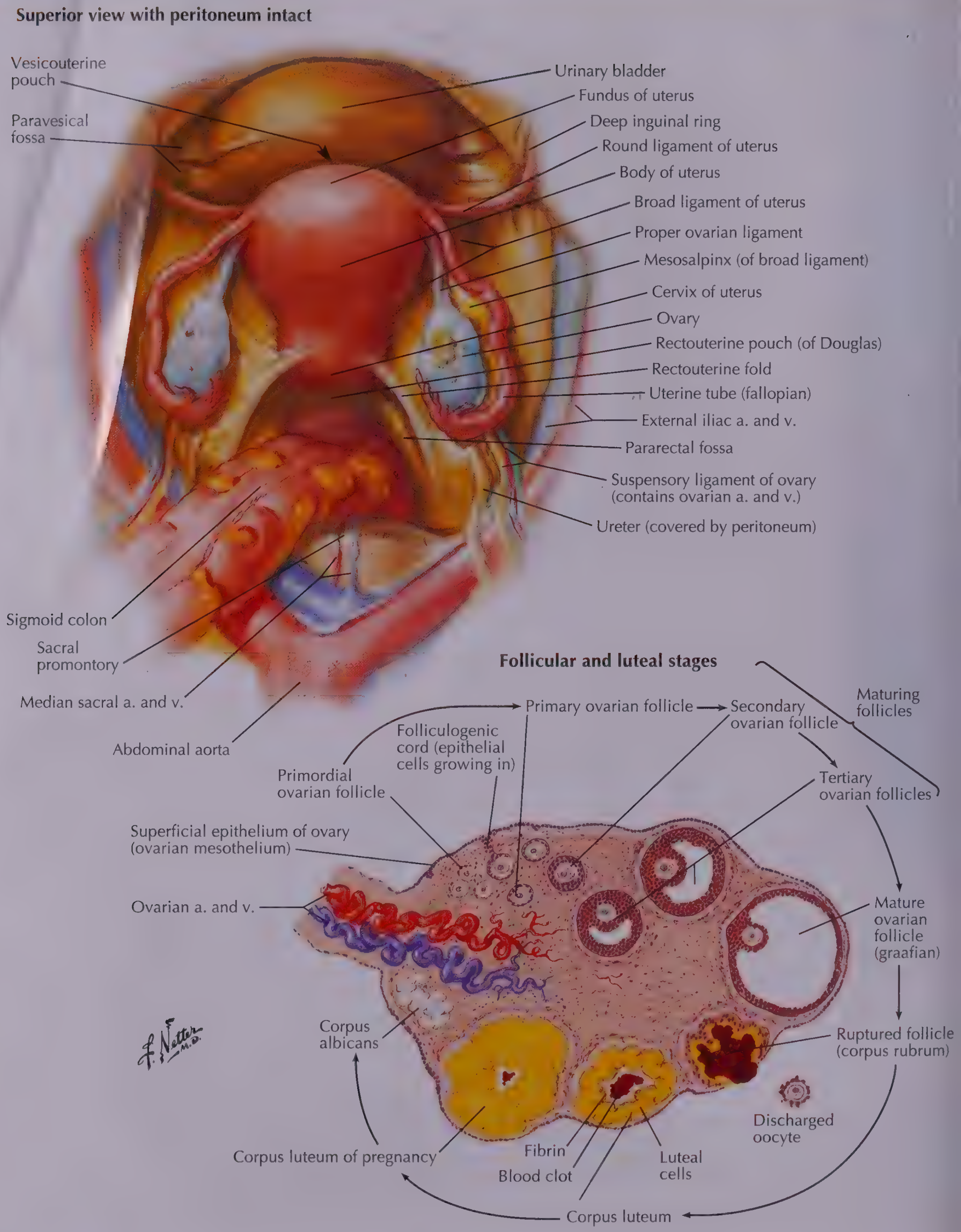
Paramedian (sagittal) dissection


Ureter
Uterine tube (fallopian)
Ovary
Proper ovarian ligament
Round ligament of uterus
Broad ligament of uterus (*cut*)
Superior pubic ramus (*cut*)
Ischiopubic ramus (*cut*)
Ischiocavernosus m.
Body of clitoris
Labia minora
Labium majus
Rectouterine pouch (of Douglas)
Peritoneum (*cut edge*)
Vesicouterine pouch
Rectum
Ureter
Urinary bladder
Vagina
Pelvic diaphragm
Deep transverse perineal m. (*cut*)
External anal sphincter
F. Netter M.D.
C.Machado M.D.

Median (sagittal) section


Sacral promontory
Ureter
Suspensory ligament of ovary
Uterine tube (fallopian)
Ovary
External iliac a. and v.
Proper ovarian ligament
Body of uterus
Round ligament of uterus
Fundus of uterus
Urinary bladder
Pubic symphysis
Urethra
External urethral sphincter
Deep transverse perineal m.
Deep dorsal v. of clitoris
Crus of clitoris
External urethral orifice
Labium minus
Labium majus
Uterosacral ligament
Vesicouterine pouch
Rectouterine pouch (of Douglas)
Cervix of uterus
Posterior part of vaginal fornix
Anterior part of vaginal fornix
Rectum
Vagina
Perineal membrane
Levator ani
External anal sphincter
Anus
Vaginal orifice

Female Internal Genital Organs



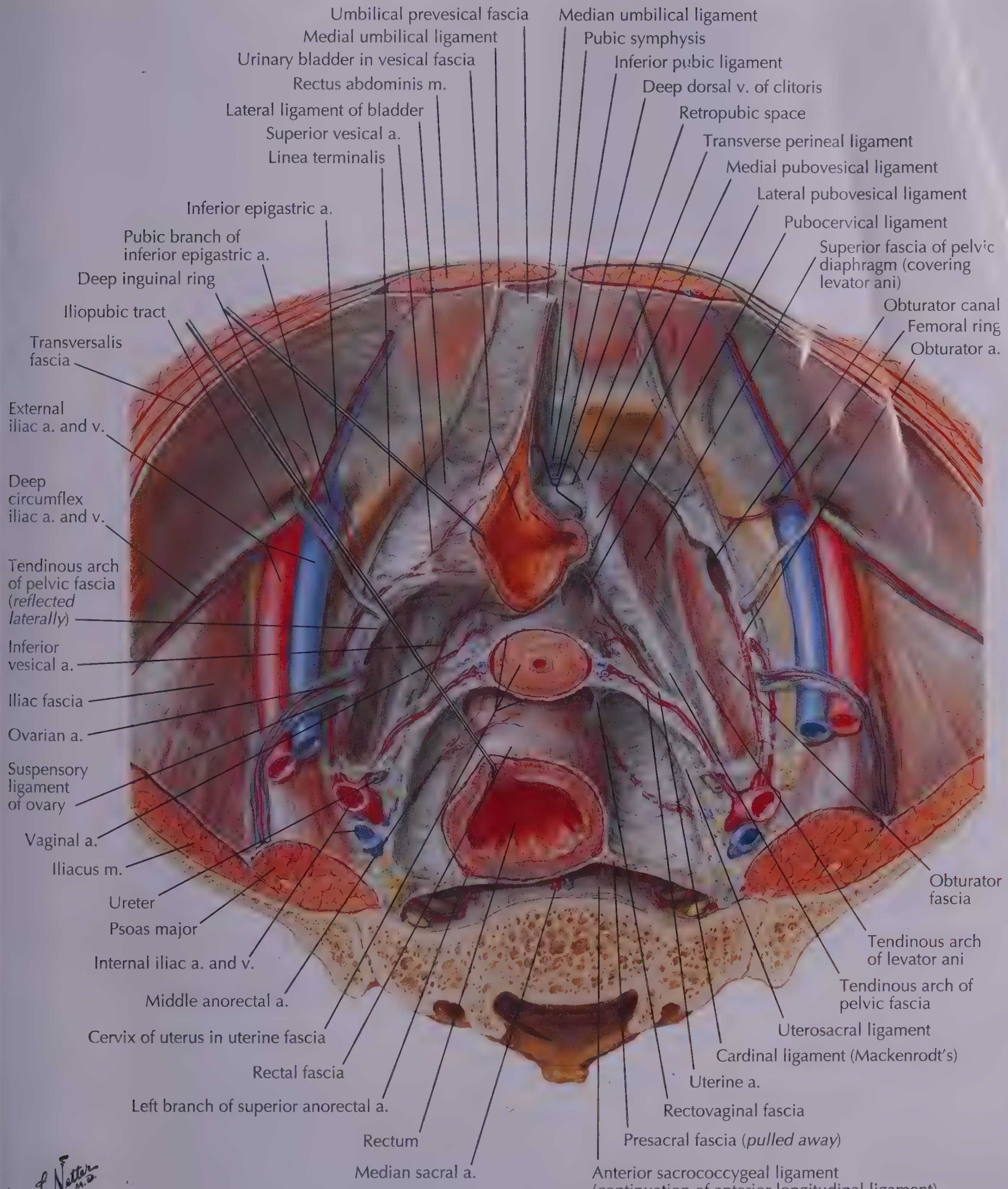
Superior view with peritoneum intact

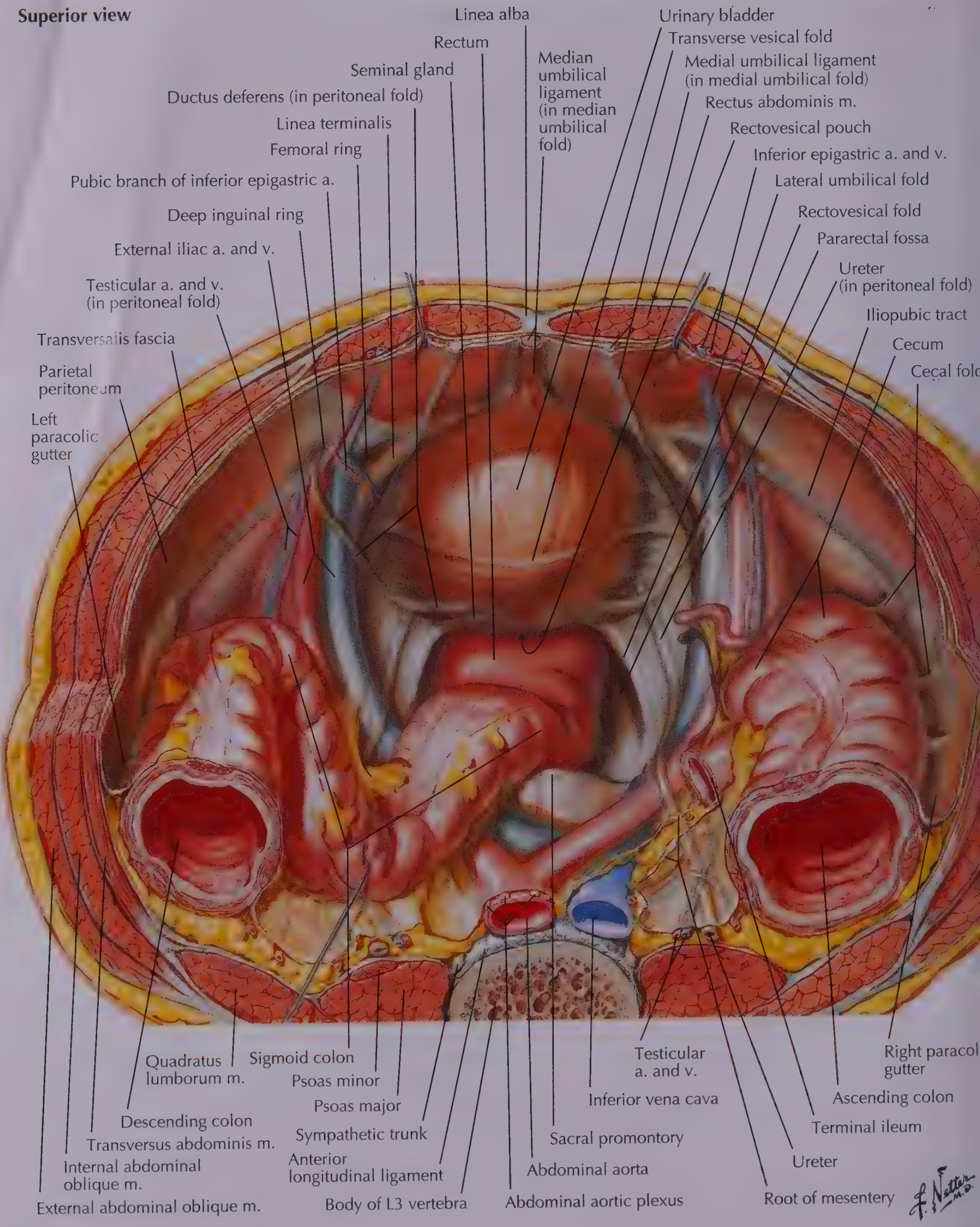
Vesicouterine pouch
Paravesical fossa
Urinary bladder
Fundus of uterus
Deep inguinal ring
Round ligament of uterus
Body of uterus
Broad ligament of uterus
Proper ovarian ligament
Mesosalpinx (of broad ligament)
Cervix of uterus
Ovary
Rectouterine pouch (of Douglas)
Rectouterine fold
Uterine tube (fallopian)
External iliac a. and v.
Pararectal fossa
Suspensory ligament of ovary (contains ovarian a. and v.)
Ureter (covered by peritoneum)
Sigmoid colon
Sacral promontory
Median sacral a. and v.
Abdominal aorta

Follicular and luteal stages

Primary ovarian follicle
Secondary ovarian follicle
Maturing follicles
Folliculogenic cord (epithelial cells growing in)
Primordial ovarian follicle
Tertiary ovarian follicles
Superficial epithelium of ovary (ovarian mesothelium)
Ovarian a. and v.
Mature ovarian follicle (graafian)
Corpus albicans
Ruptured follicle (corpus rubrum)
Discharged oocyte
Corpus luteum of pregnancy
Fibrin
Blood clot
Luteal cells
Corpus luteum

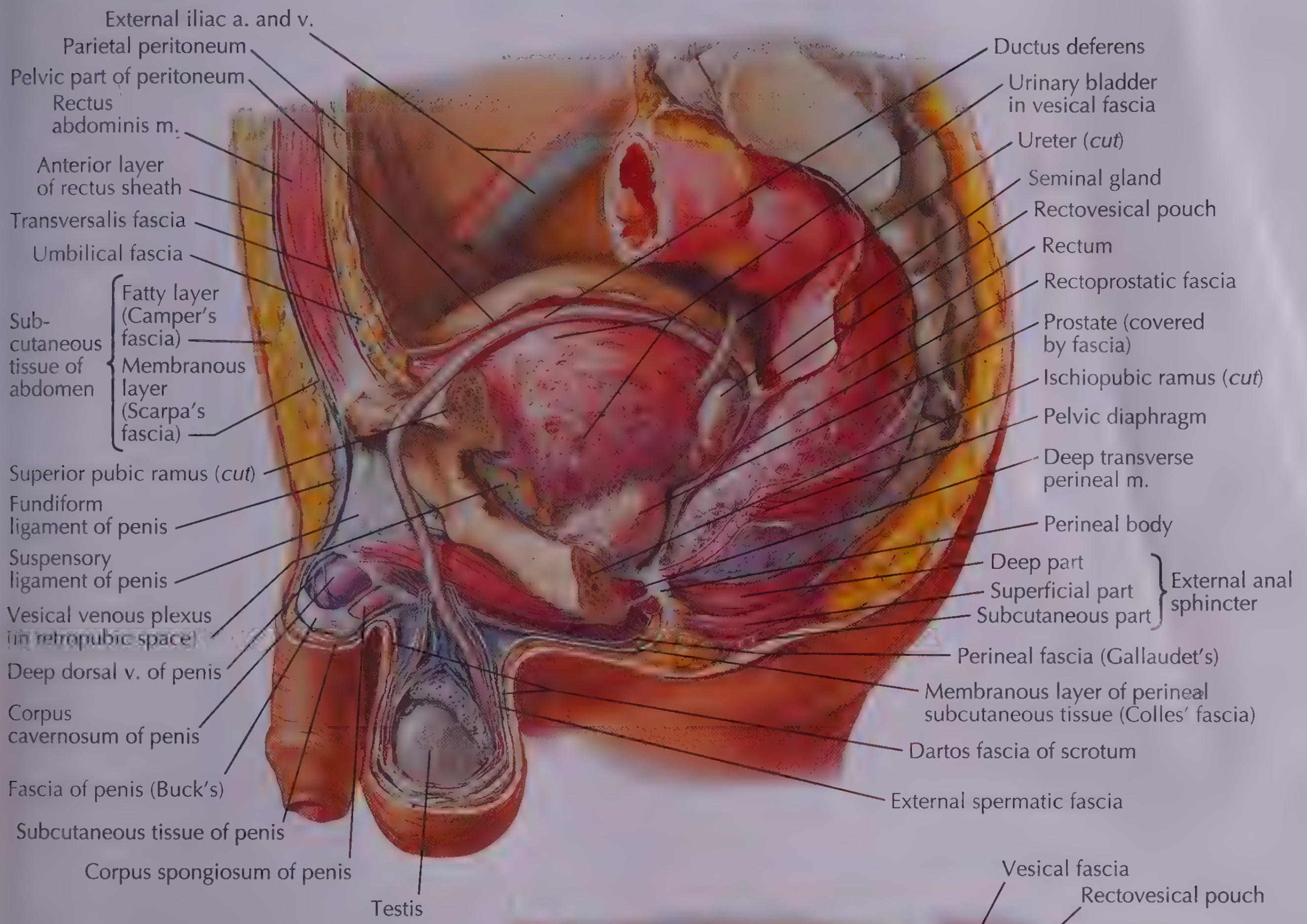
Female: superior view (peritoneum and loose connective tissue removed)


Umbilical prevesical fascia
Medial umbilical ligament
Urinary bladder in vesical fascia
Rectus abdominis m.
Lateral ligament of bladder
Superior vesical a.
Linea terminalis
Inferior epigastric a.
Pubic branch of inferior epigastric a.
Deep inguinal ring
Iliopubic tract
Transversalis fascia
External iliac a. and v.
Deep circumflex iliac a. and v.
Tendinous arch of pelvic fascia (*reflected laterally*)
Inferior vesical a.
Iliac fascia
Ovarian a.
Suspensory ligament of ovary
Vaginal a.
Iliacus m.
Ureter
Psoas major
Internal iliac a. and v.
Middle anorectal a.
Cervix of uterus in uterine fascia
Rectal fascia
Left branch of superior anorectal a.
Rectum
Median sacral a.
Median umbilical ligament
Pubic symphysis
Inferior pubic ligament
Deep dorsal v. of clitoris
Retropubic space
Transverse perineal ligament
Medial pubovesical ligament
Lateral pubovesical ligament
Pubocervical ligament
Superior fascia of pelvic diaphragm (covering levator ani)
Obturator canal
Femoral ring
Obturator a.
Obturator fascia
Tendinous arch of levator ani
Tendinous arch of pelvic fascia
Uterosacral ligament
Cardinal ligament (Mackenrodt's)
Uterine a.
Rectovaginal fascia
Presacral fascia (*pulled away*)
Anterior sacrococcygeal ligament (continuation of anterior longitudinal ligament)



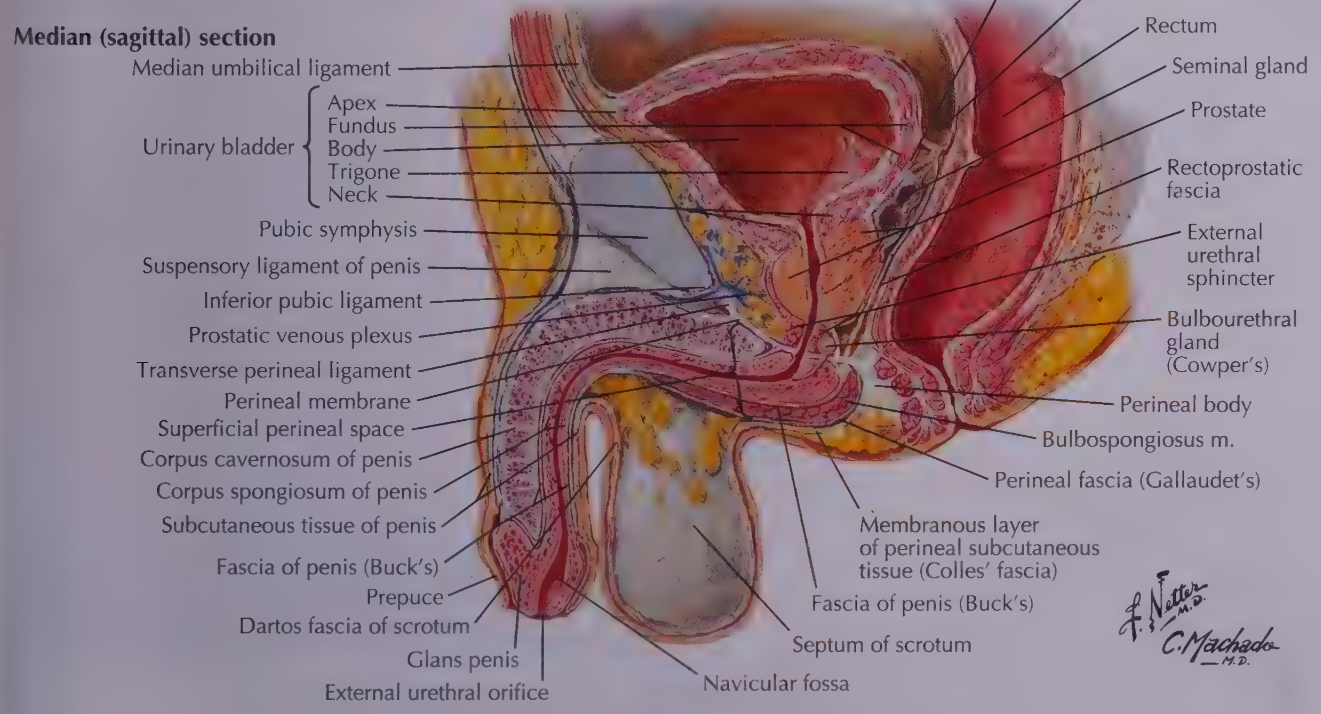
Superior view

Linea alba
Rectum
Seminal gland
Ductus deferens (in peritoneal fold)
Linea terminalis
Femoral ring
Pubic branch of inferior epigastric a.
Deep inguinal ring
External iliac a. and v.
Testicular a. and v. (in peritoneal fold)
Transversalis fascia
Parietal peritoneum
Left paracolic gutter
Median umbilical ligament (in median umbilical fold)
Urinary bladder
Transverse vesical fold
Medial umbilical ligament (in medial umbilical fold)
Rectus abdominis m.
Rectovesical pouch
Inferior epigastric a. and v.
Lateral umbilical fold
Rectovesical fold
Pararectal fossa
Ureter (in peritoneal fold)
Iliopubic tract
Cecum
Cecal fol
Quadratus lumborum m.
Sigmoid colon
Psoas minor
Psoas major
Descending colon
Transversus abdominis m.
Internal abdominal oblique m.
External abdominal oblique m.
Sympathetic trunk
Anterior longitudinal ligament
Body of L3 vertebra
Testicular a. and v.
Inferior vena cava
Sacral promontory
Abdominal aorta
Abdominal aortic plexus
Right paracol gutter
Ascending colon
Terminal ileum
Ureter
Root of mesentery



Parasagittal view

External iliac a. and v.
Parietal peritoneum
Pelvic part of peritoneum
Rectus abdominis m.
Anterior layer of rectus sheath
Transversalis fascia
Umbilical fascia
Sub-cutaneous tissue of abdomen
Fatty layer (Camper's fascia)
Membranous layer (Scarpa's fascia)
Superior pubic ramus (*cut*)
Fundiform ligament of penis
Suspensory ligament of penis
Vesical venous plexus (in retropubic space)
Deep dorsal v. of penis
Corpus cavernosum of penis
Fascia of penis (Buck's)
Subcutaneous tissue of penis
Corpus spongiosum of penis
Testis
Ductus deferens
Urinary bladder in vesical fascia
Ureter (*cut*)
Seminal gland
Rectovesical pouch
Rectum
Rectoprostatic fascia
Prostate (covered by fascia)
Ischiopubic ramus (*cut*)
Pelvic diaphragm
Deep transverse perineal m.
Perineal body
Deep part
Superficial part
Subcutaneous part
External anal sphincter
Perineal fascia (Gallaudet's)
Membranous layer of perineal subcutaneous tissue (Colles' fascia)
Dartos fascia of scrotum
External spermatic fascia

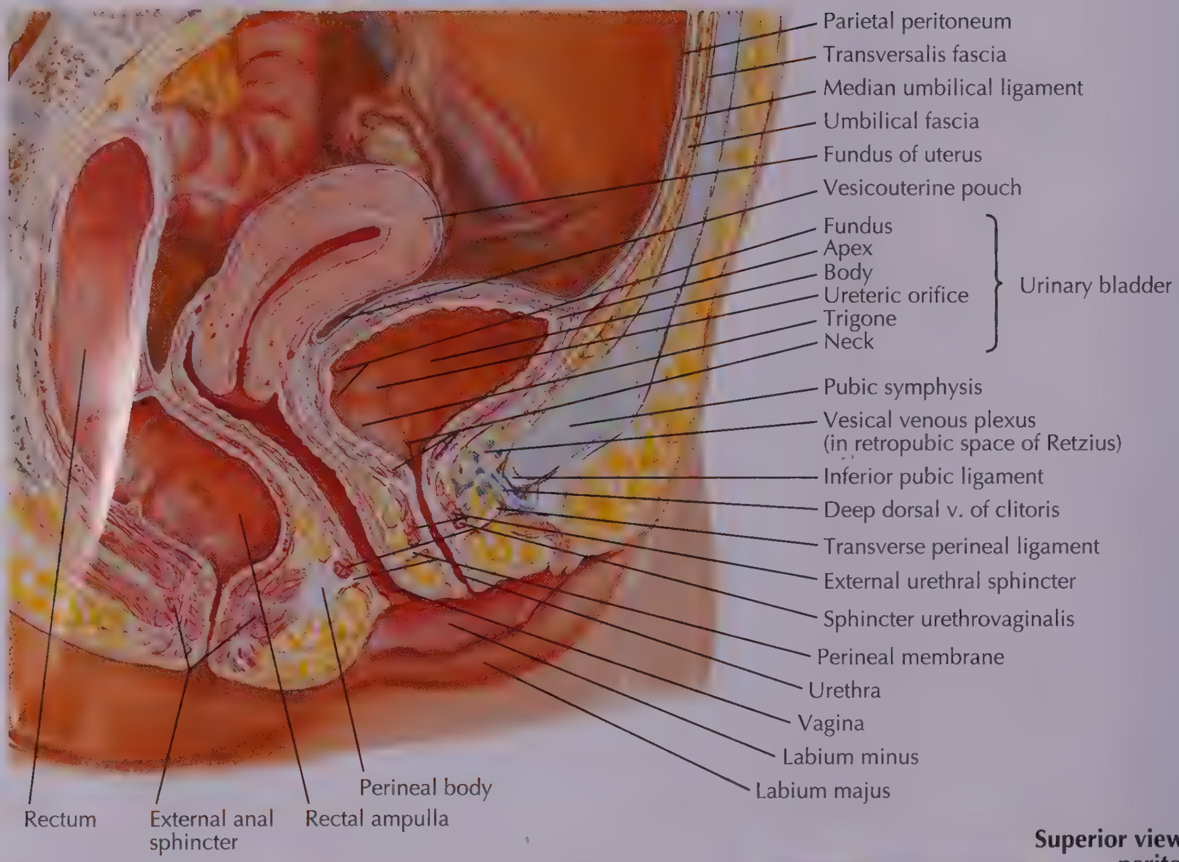


Median (sagittal) section

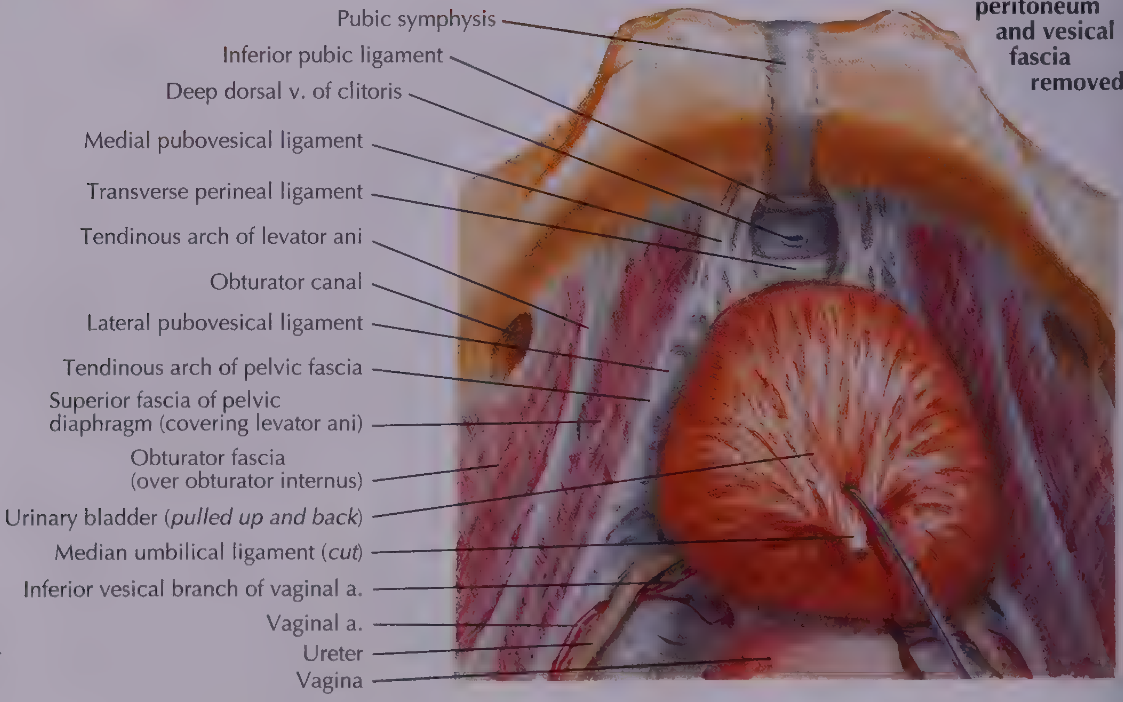
Median umbilical ligament
Urinary bladder
Apex
Fundus
Body
Trigone
Neck
Pubic symphysis
Suspensory ligament of penis
Inferior pubic ligament
Prostatic venous plexus
Transverse perineal ligament
Perineal membrane
Superficial perineal space
Corpus cavernosum of penis
Corpus spongiosum of penis
Subcutaneous tissue of penis
Fascia of penis (Buck's)
Prepuce
Dartos fascia of scrotum
Glans penis
External urethral orifice
Vesical fascia
Rectovesical pouch
Rectum
Seminal gland
Prostate
Rectoprostatic fascia
External urethral sphincter
Bulbourethral gland (Cowper's)
Perineal body
Bulbospongiosus m.
Perineal fascia (Gallaudet's)
Membranous layer of perineal subcutaneous tissue (Colles' fascia)
Fascia of penis (Buck's)
Septum of scrotum
Navicular fossa
F. Netter M.D.
C. Machado M.D.

Urinary Bladder: Orientation and Supports

Female: median section


Parietal peritoneum
Transversalis fascia
Median umbilical ligament
Umbilical fascia
Fundus of uterus
Vesicouterine pouch
Fundus
Apex
Body
Ureteric orifice
Trigone
Neck
Urinary bladder
Pubic symphysis
Vesical venous plexus (in retropubic space of Retzius)
Inferior pubic ligament
Deep dorsal v. of clitoris
Transverse perineal ligament
External urethral sphincter
Sphincter urethrovaginalis
Perineal membrane
Urethra
Vagina
Labium minus
Labium majus
Perineal body
Rectum
External anal sphincter
Rectal ampulla

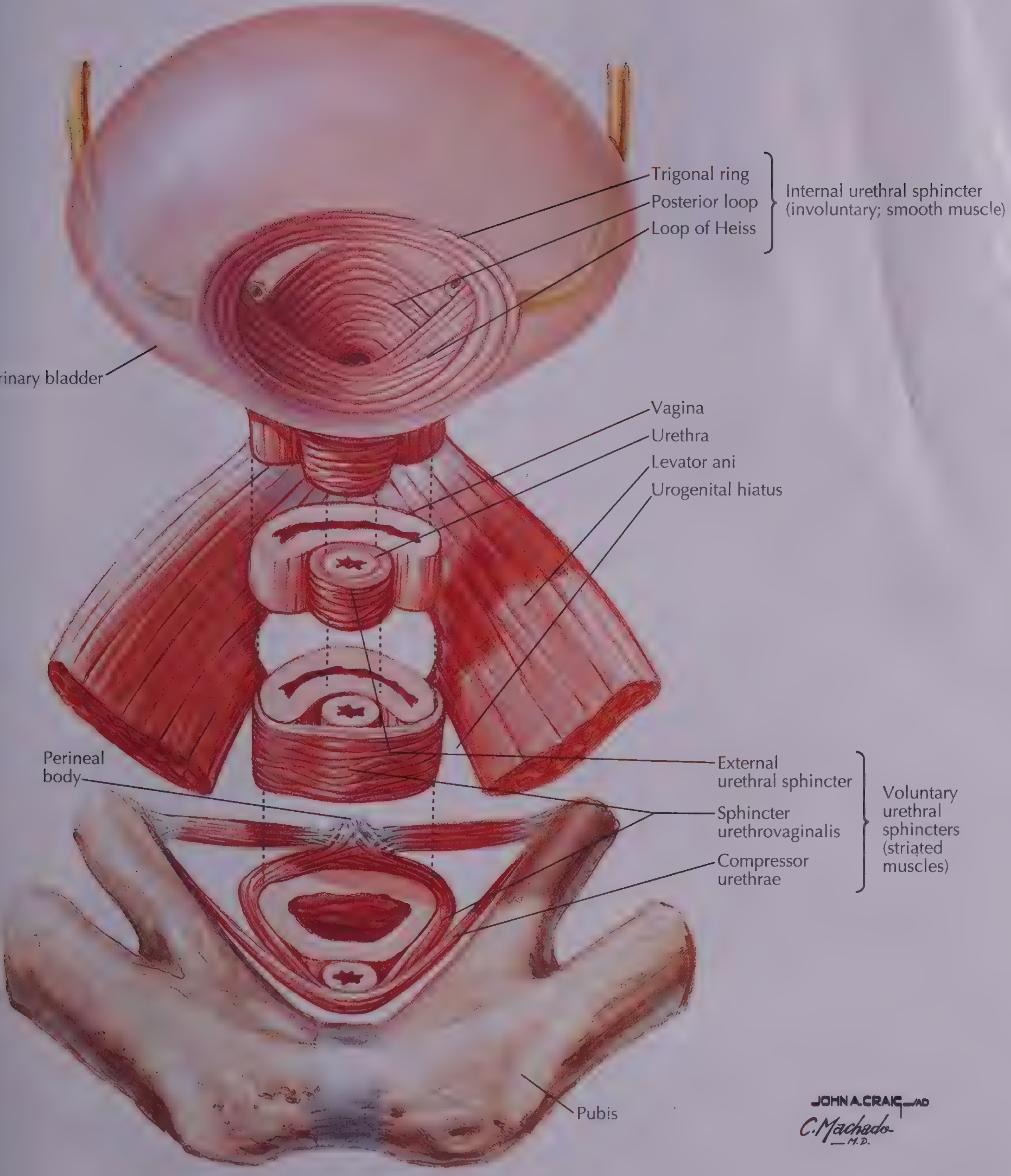
Superior view with peritoneum and vesical fascia removed


Pubic symphysis
Inferior pubic ligament
Deep dorsal v. of clitoris
Medial pubovesical ligament
Transverse perineal ligament
Tendinous arch of levator ani
Obturator canal
Lateral pubovesical ligament
Tendinous arch of pelvic fascia
Superior fascia of pelvic diaphragm (covering levator ani)
Obturator fascia (over obturator internus)
Urinary bladder (*pulled up and back*)
Median umbilical ligament (*cut*)
Inferior vesical branch of vaginal a.
Vaginal a.
Ureter
Vagina

F. Netter M.D.
C.Machado M.D.

Female Urethral Sphincters

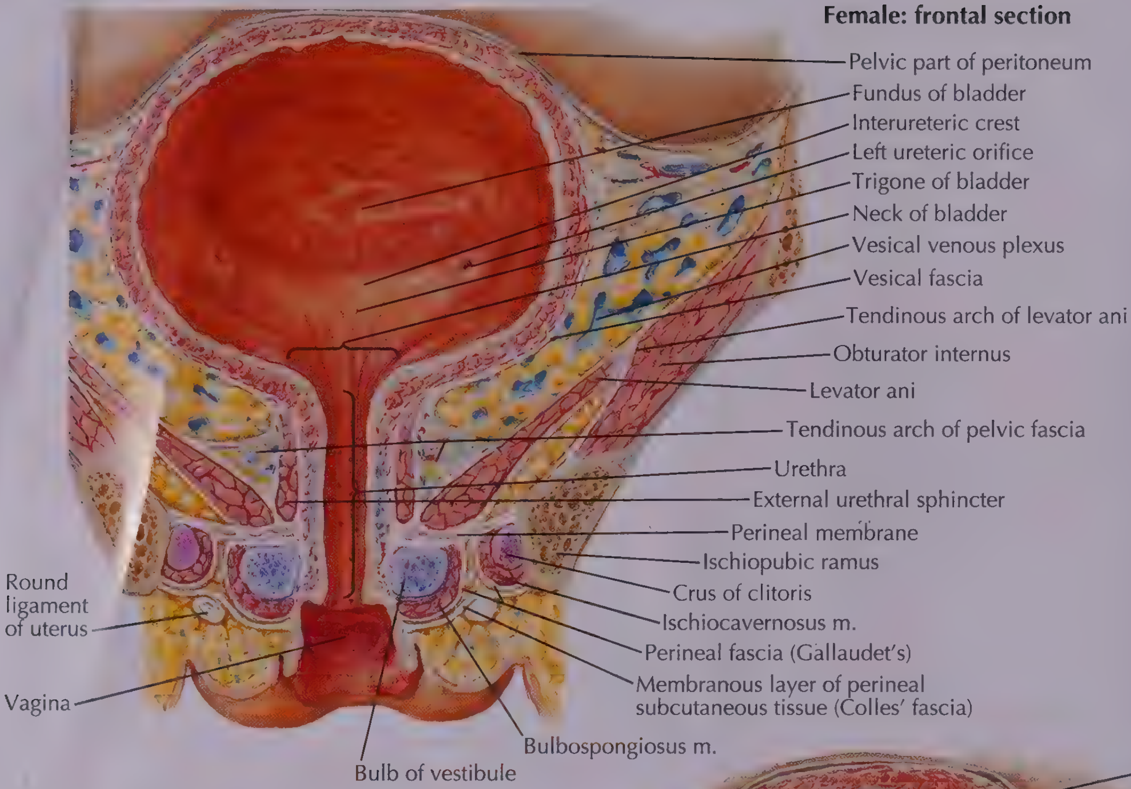
See also Plates 371, 379


Trigonal ring
Posterior loop
Loop of Heiss
Internal urethral sphincter (involuntary; smooth muscle)
Urinary bladder
Vagina
Urethra
Levator ani
Urogenital hiatus
Perineal body
External urethral sphincter
Sphincter urethrovaginalis
Compressor urethrae
Voluntary urethral sphincters (striated muscles)
Pubis
JOHN A.CRAIG—AD
C.Machado—M.D.

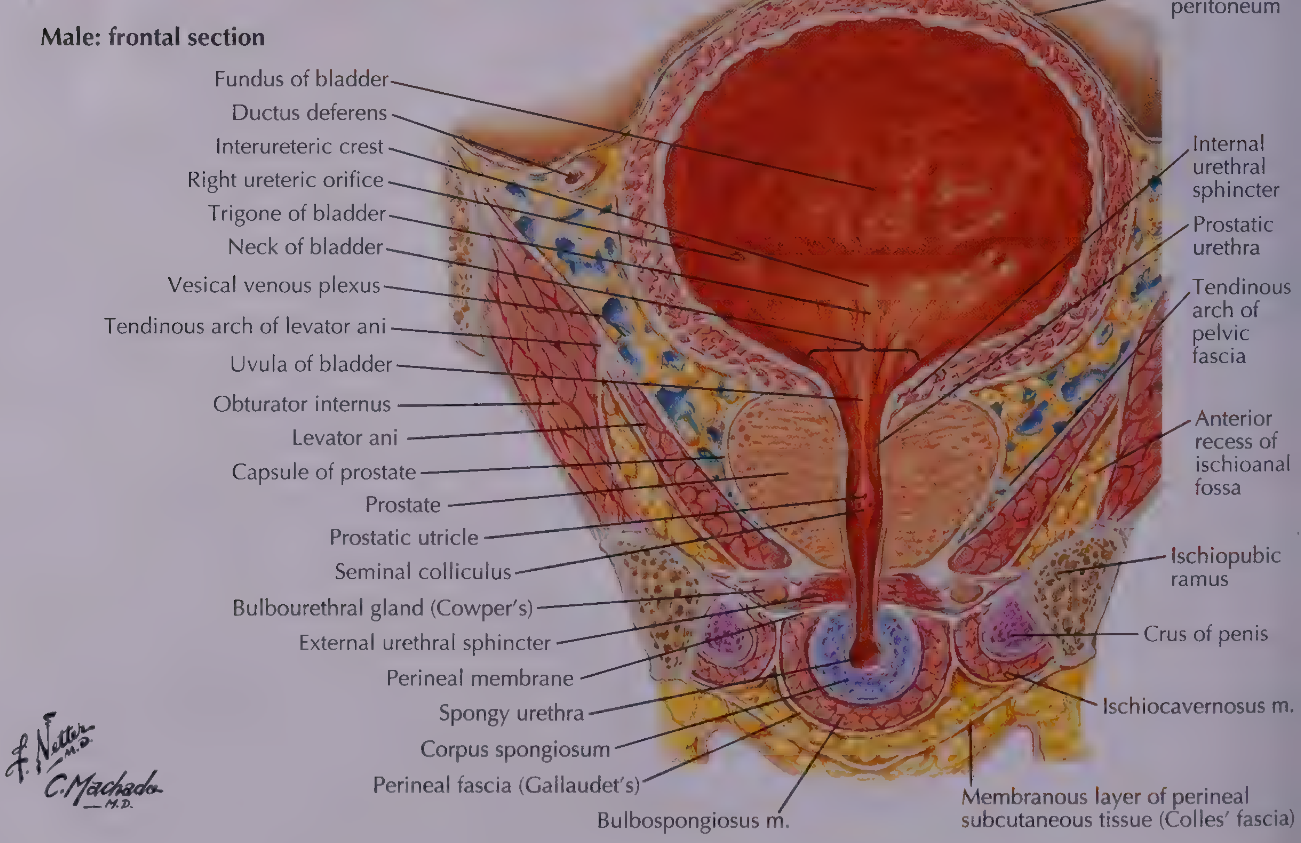
Urinary Bladder: Female and Male

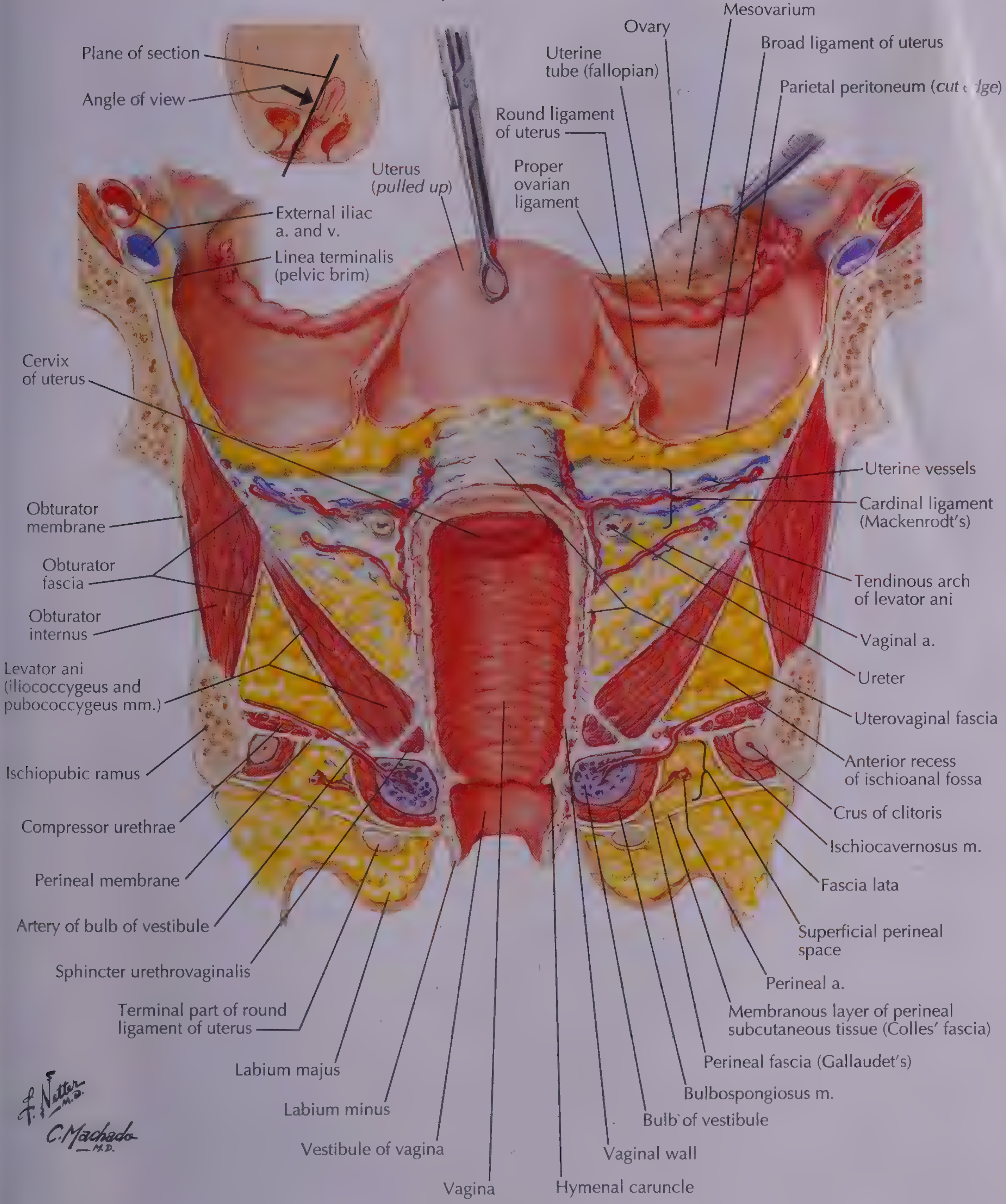
See also Plates 364, 368, 405, BP 85, BP 86

Female: frontal section


Pelvic part of peritoneum
Fundus of bladder
Interureteric crest
Left ureteric orifice
Trigone of bladder
Neck of bladder
Vesical venous plexus
Vesical fascia
Tendinous arch of levator ani
Obturator internus
Levator ani
Tendinous arch of pelvic fascia
Urethra
External urethral sphincter
Perineal membrane
Ischiopubic ramus
Crus of clitoris
Ischiocavernosus m.
Perineal fascia (Gallaudet's)
Membranous layer of perineal subcutaneous tissue (Colles' fascia)
Round ligament of uterus
Vagina
Bulb of vestibule
Bulbospongiosus m.

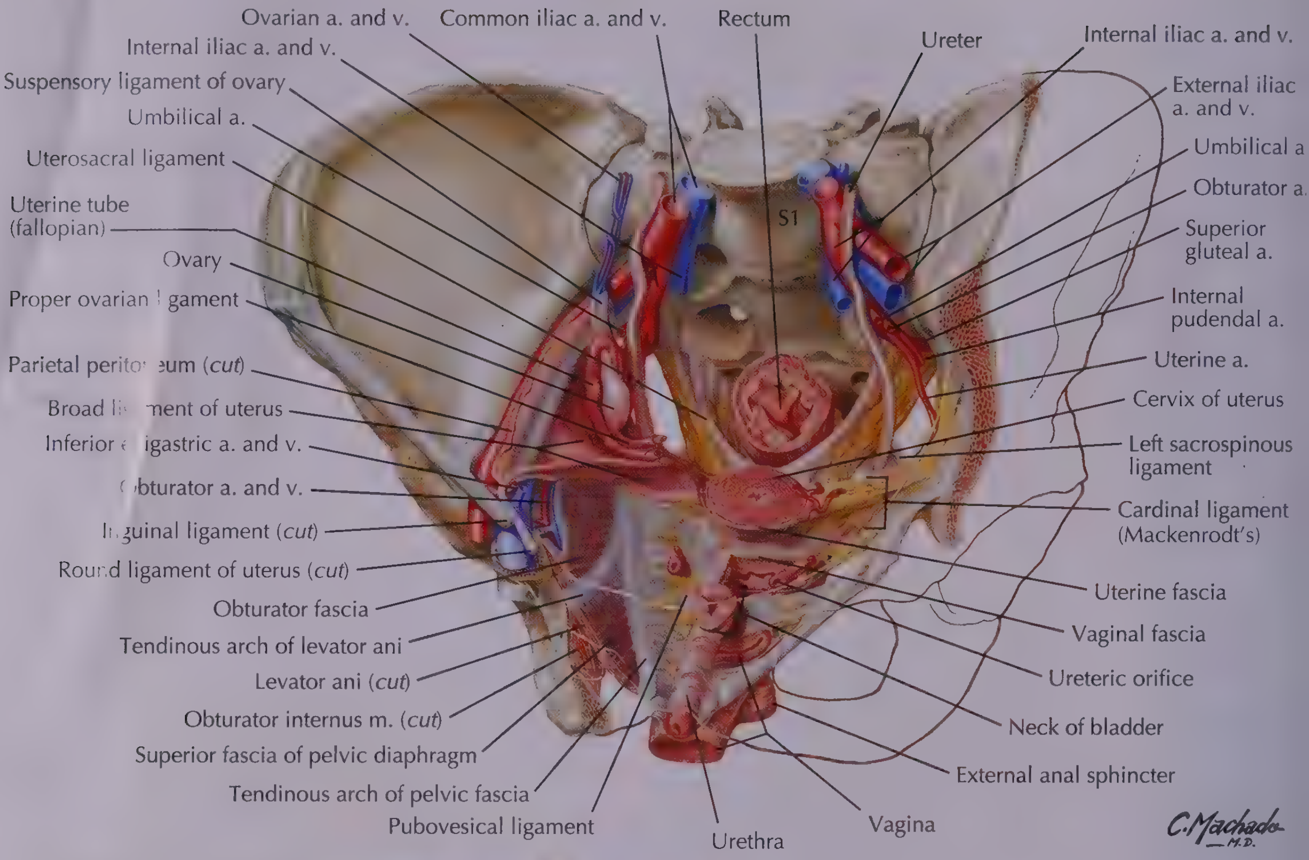
Male: frontal section


Pelvic part of peritoneum
Fundus of bladder
Ductus deferens
Interureteric crest
Right ureteric orifice
Trigone of bladder
Neck of bladder
Vesical venous plexus
Tendinous arch of levator ani
Uvula of bladder
Obturator internus
Levator ani
Capsule of prostate
Prostate
Prostatic utricle
Seminal colliculus
Bulbourethral gland (Cowper's)
External urethral sphincter
Perineal membrane
Spongy urethra
Corpus spongiosum
Perineal fascia (Gallaudet's)
Bulbospongiosus m.
Internal urethral sphincter
Prostatic urethra
Tendinous arch of pelvic fascia
Anterior recess of ischioanal fossa
Ischiopubic ramus
Crus of penis
Ischiocavernosus m.
Membranous layer of perineal subcutaneous tissue (Colles' fascia)
F. Netter M.D.
C. Machado M.D.

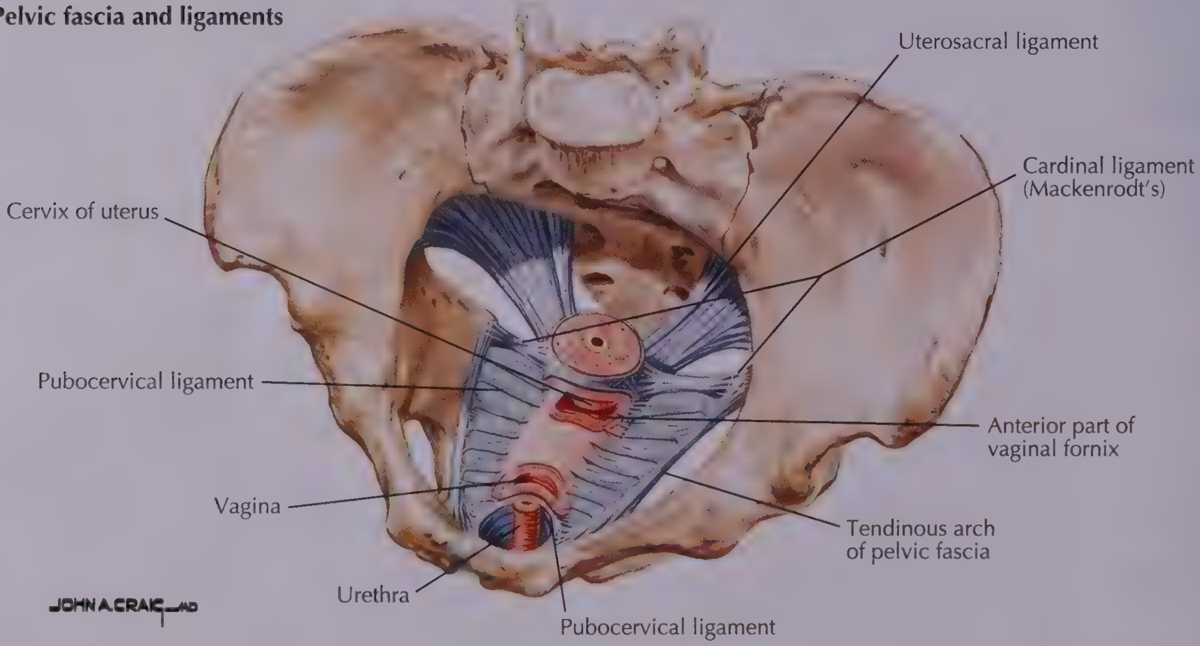

Plane of section
Angle of view
External iliac a. and v.
Linea terminalis (pelvic brim)
Uterus (*pulled up*)
Round ligament of uterus
Proper ovarian ligament
Uterine tube (fallopian)
Ovary
Mesovarium
Broad ligament of uterus
Parietal peritoneum (*cut edge*)
Cervix of uterus
Obturator membrane
Obturator fascia
Obturator internus
Levator ani (iliococcygeus and pubococcygeus mm.)
Ischiopubic ramus
Compressor urethrae
Perineal membrane
Artery of bulb of vestibule
Sphincter urethrovaginalis
Terminal part of round ligament of uterus
Labium majus
Labium minus
Vestibule of vagina
Vagina
Hymenal caruncle
Vaginal wall
Bulb of vestibule
Bulbospongiosus m.
Perineal fascia (Gallaudet's)
Membranous layer of perineal subcutaneous tissue (Colles' fascia)
Perineal a.
Superficial perineal space
Fascia lata
Ischiocavernosus m.
Crus of clitoris
Anterior recess of ischioanal fossa
Uterovaginal fascia
Ureter
Vaginal a.
Tendinous arch of levator ani
Cardinal ligament (Mackenrodt's)
Uterine vessels
F. Netter M.D.
C. Machado M.D.

Uterus: Fascial Ligaments

See also Plate 366

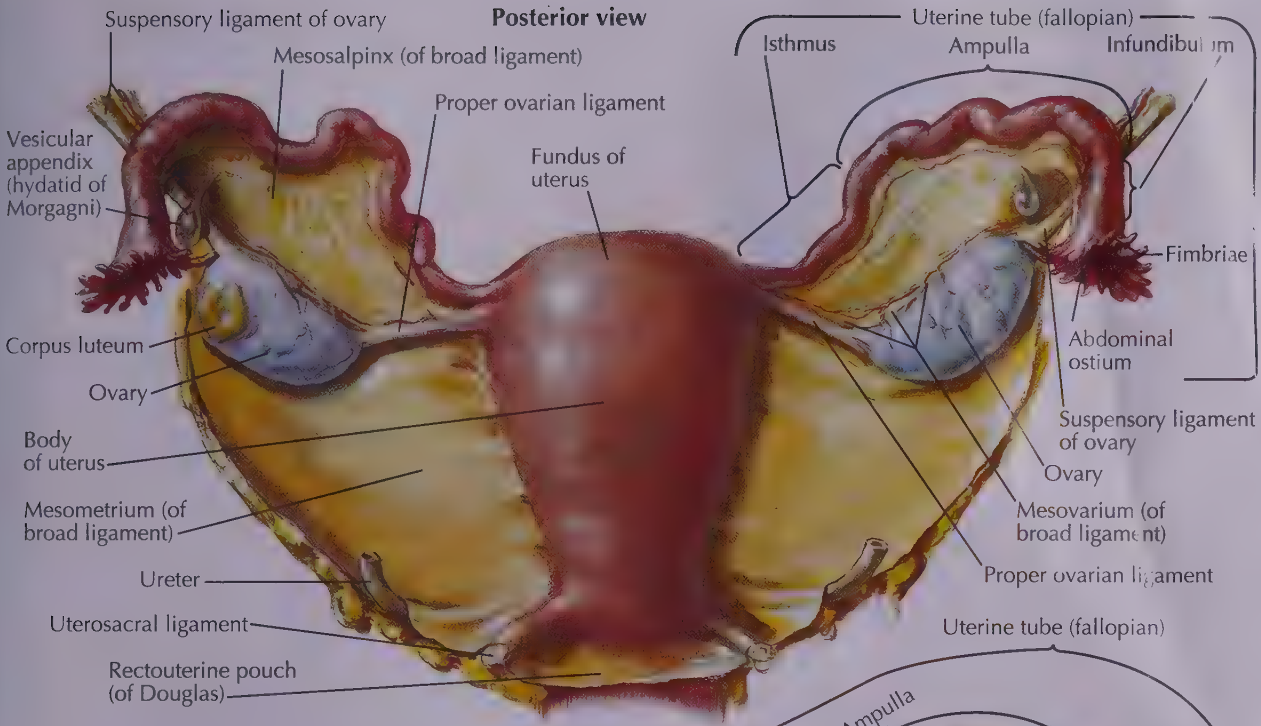

Ovarian a. and v.
Common iliac a. and v.
Rectum
Ureter
Internal iliac a. and v.
Internal iliac a. and v.
Suspensory ligament of ovary
External iliac a. and v.
Umbilical a.
Umbilical a
Uterosacral ligament
Obturator a.
Uterine tube (fallopian)
S1
Superior gluteal a.
Ovary
Proper ovarian ligament
Internal pudendal a.
Parietal peritoneum (*cut*)
Uterine a.
Cervix of uterus
Broad ligament of uterus
Inferior epigastric a. and v.
Left sacrospinous ligament
Obturator a. and v.
Cardinal ligament (Mackenrodt's)
Inguinal ligament (*cut*)
Round ligament of uterus (*cut*)
Uterine fascia
Obturator fascia
Vaginal fascia
Tendinous arch of levator ani
Levator ani (*cut*)
Ureteric orifice
Obturator internus m. (*cut*)
Neck of bladder
Superior fascia of pelvic diaphragm
External anal sphincter
Tendinous arch of pelvic fascia
Pubovesical ligament
Urethra
Vagina
C. Machado M.D.

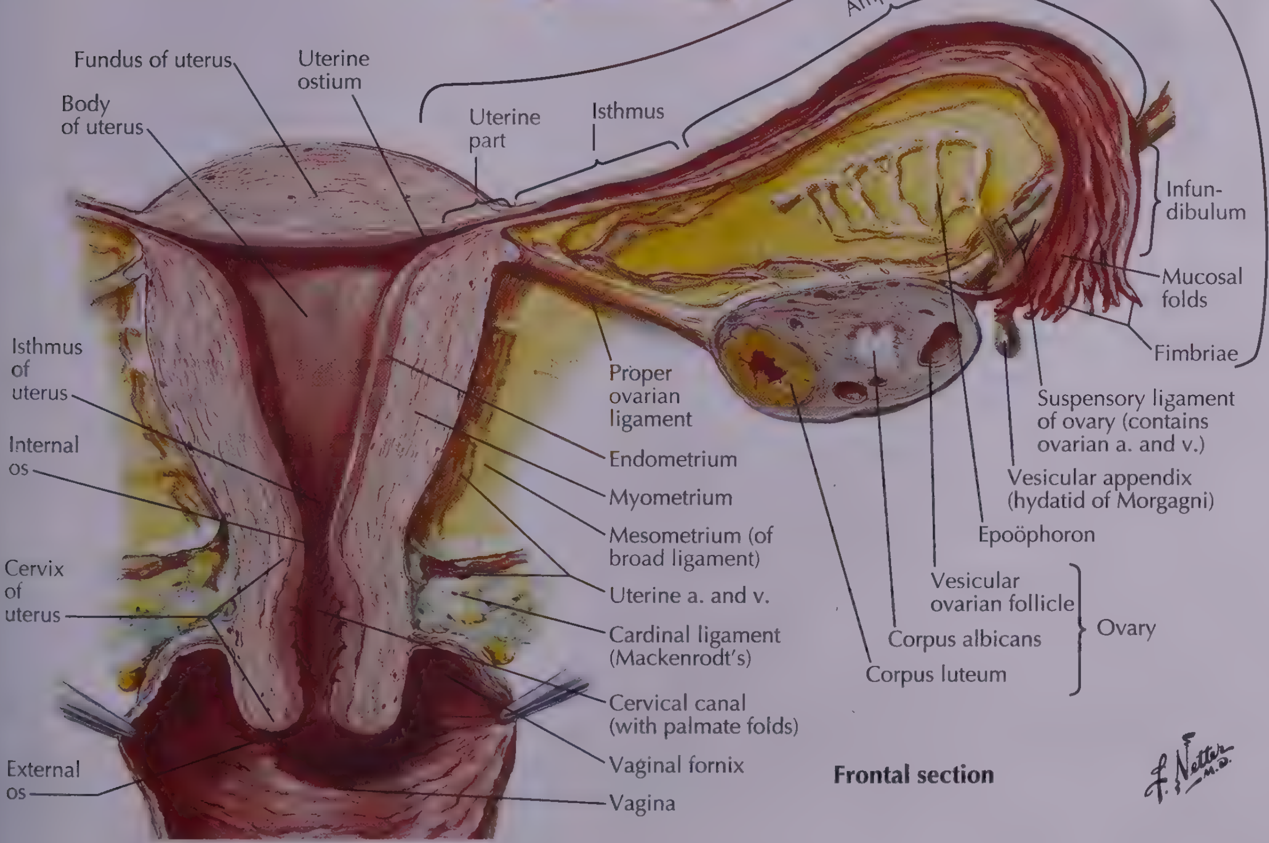
Pelvic fascia and ligaments


Uterosacral ligament
Cardinal ligament (Mackenrodt's)
Cervix of uterus
Pubocervical ligament
Anterior part of vaginal fornix
Vagina
Tendinous arch of pelvic fascia
Urethra
Pubocervical ligament
JOHN A.CRAIG MD

See also Plates BP 89, BP 90

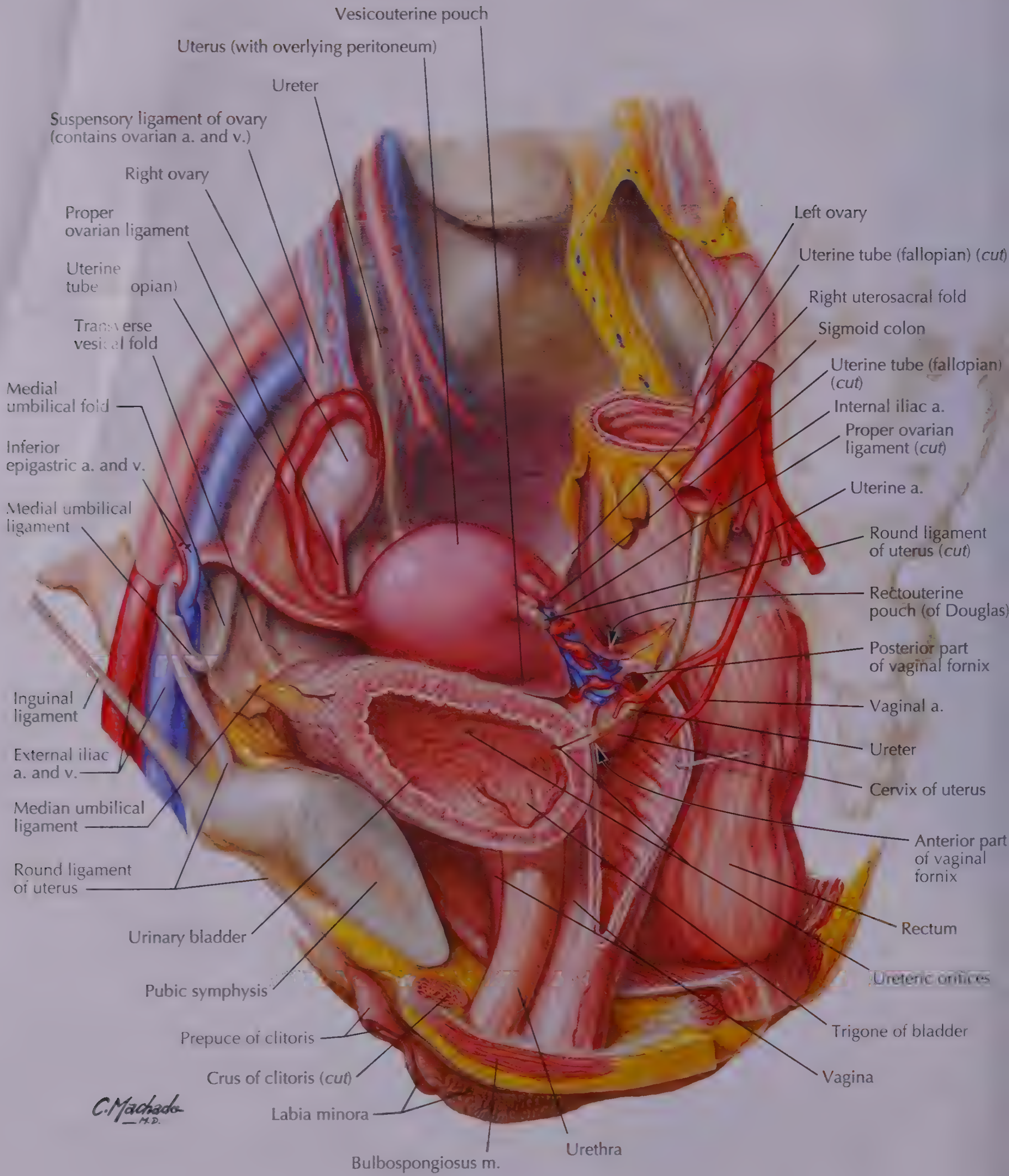
Posterior view

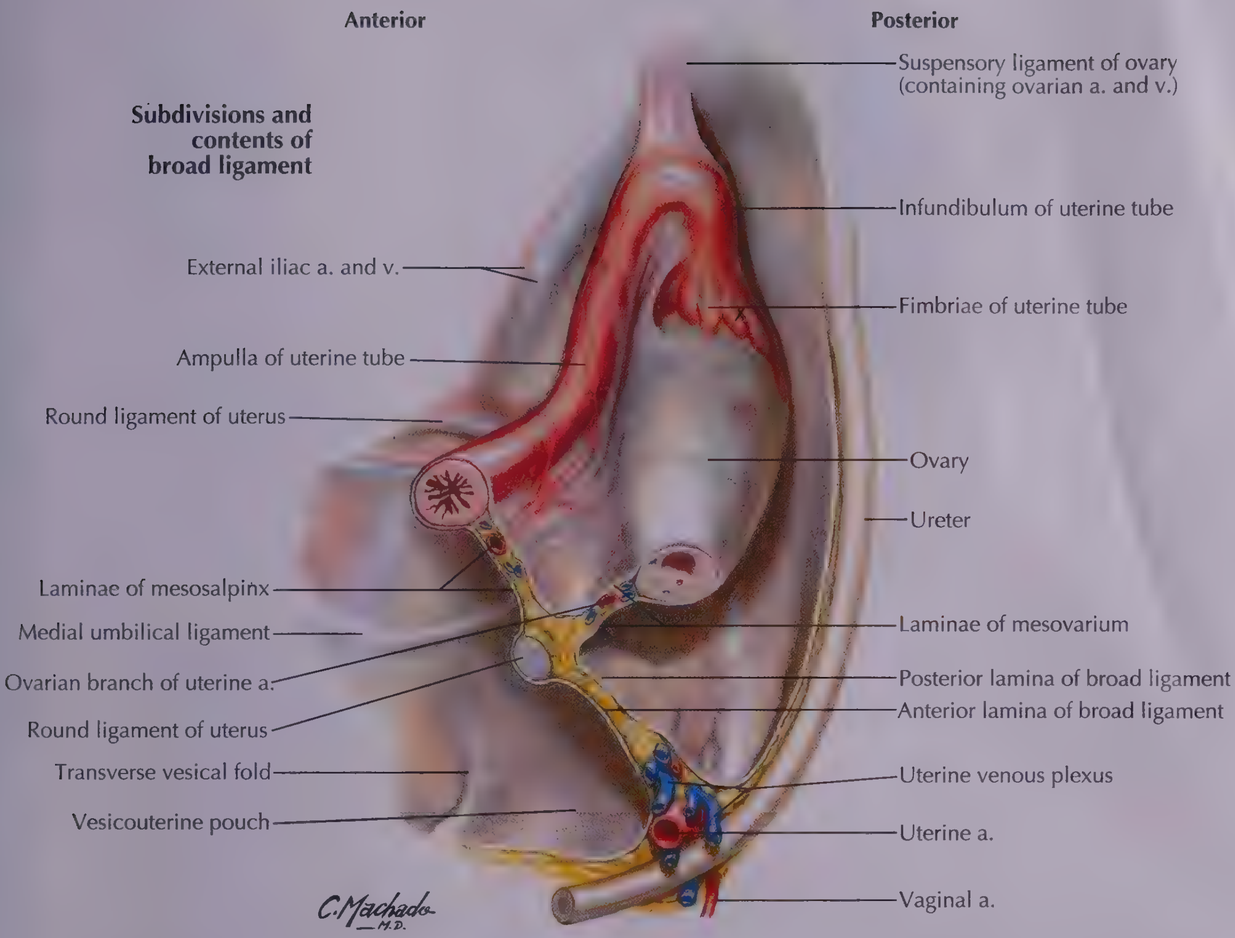

Suspensory ligament of ovary
Mesosalpinx (of broad ligament)
Proper ovarian ligament
Fundus of uterus
Vesicular appendix (hydatid of Morgagni)
Corpus luteum
Ovary
Body of uterus
Mesometrium (of broad ligament)
Ureter
Uterosacral ligament
Rectouterine pouch (of Douglas)
Uterine tube (fallopian)
Isthmus
Ampulla
Infundibulum
Fimbriae
Abdominal ostium
Suspensory ligament of ovary
Ovary
Mesovarium (of broad ligament)
Proper ovarian ligament


Uterine tube (fallopian)
Ampulla
Fundus of uterus
Uterine ostium
Body of uterus
Uterine part
Isthmus
Infundibulum
Mucosal folds
Fimbriae
Isthmus of uterus
Internal os
Cervix of uterus
External os
Proper ovarian ligament
Endometrium
Myometrium
Mesometrium (of broad ligament)
Uterine a. and v.
Cardinal ligament (Mackenrodt's)
Cervical canal (with palmate folds)
Vaginal fornix
Vagina
Suspensory ligament of ovary (contains ovarian a. and v.)
Vesicular appendix (hydatid of Morgagni)
Epoöphoron
Vesicular ovarian follicle
Corpus albicans
Corpus luteum
Ovary
F. Netter M.D.

Frontal section

Pelvic Viscera: Female

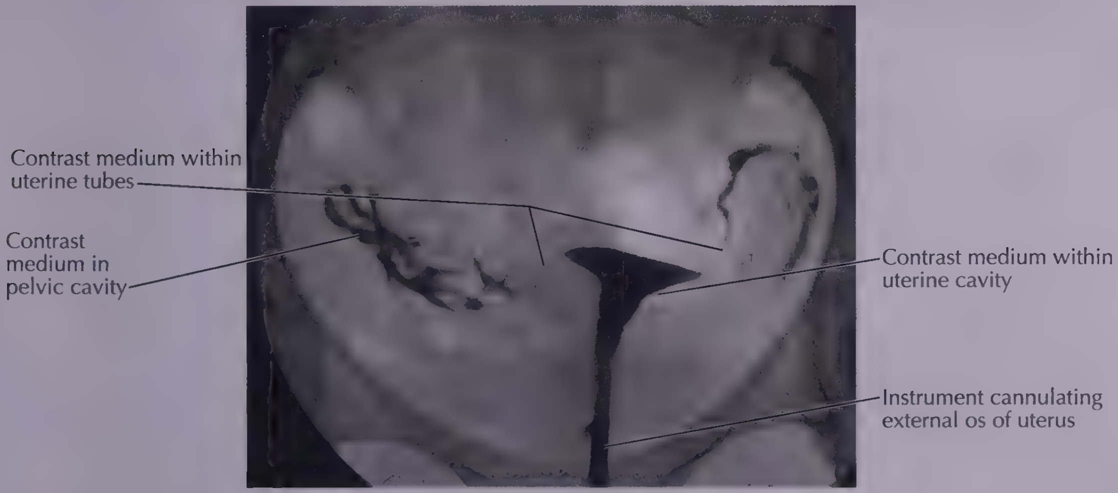

Vesicouterine pouch
Uterus (with overlying peritoneum)
Ureter
Suspensory ligament of ovary (contains ovarian a. and v.)
Right ovary
Proper ovarian ligament
Uterine tube opian)
Transverse vesical fold
Medial umbilical fold
Inferior epigastric a. and v.
Medial umbilical ligament
Inguinal ligament
External iliac a. and v.
Median umbilical ligament
Round ligament of uterus
Urinary bladder
Pubic symphysis
Prepuce of clitoris
Crus of clitoris (*cut*)
Labia minora
Bulbospongiosus m.
Urethra
C.Machado M.D.
Left ovary
Uterine tube (fallopian) (*cut*)
Right uterosacral fold
Sigmoid colon
Uterine tube (fallopian) (*cut*)
Internal iliac a.
Proper ovarian ligament (*cut*)
Uterine a.
Round ligament of uterus (*cut*)
Rectouterine pouch (of Douglas)
Posterior part of vaginal fornix
Vaginal a.
Ureter
Cervix of uterus
Anterior part of vaginal fornix
Rectum
Ureteric orifices
Trigone of bladder
Vagina



Subdivisions and contents of broad ligament

Anterior
Posterior
External iliac a. and v.
Ampulla of uterine tube
Round ligament of uterus
Laminae of mesosalpinx
Medial umbilical ligament
Ovarian branch of uterine a.
Round ligament of uterus
Transverse vesical fold
Vesicouterine pouch
Suspensory ligament of ovary (containing ovarian a. and v.)
Infundibulum of uterine tube
Fimbriae of uterine tube
Ovary
Ureter
Laminae of mesovarium
Posterior lamina of broad ligament
Anterior lamina of broad ligament
Uterine venous plexus
Uterine a.
Vaginal a.
C. Machado M.D.

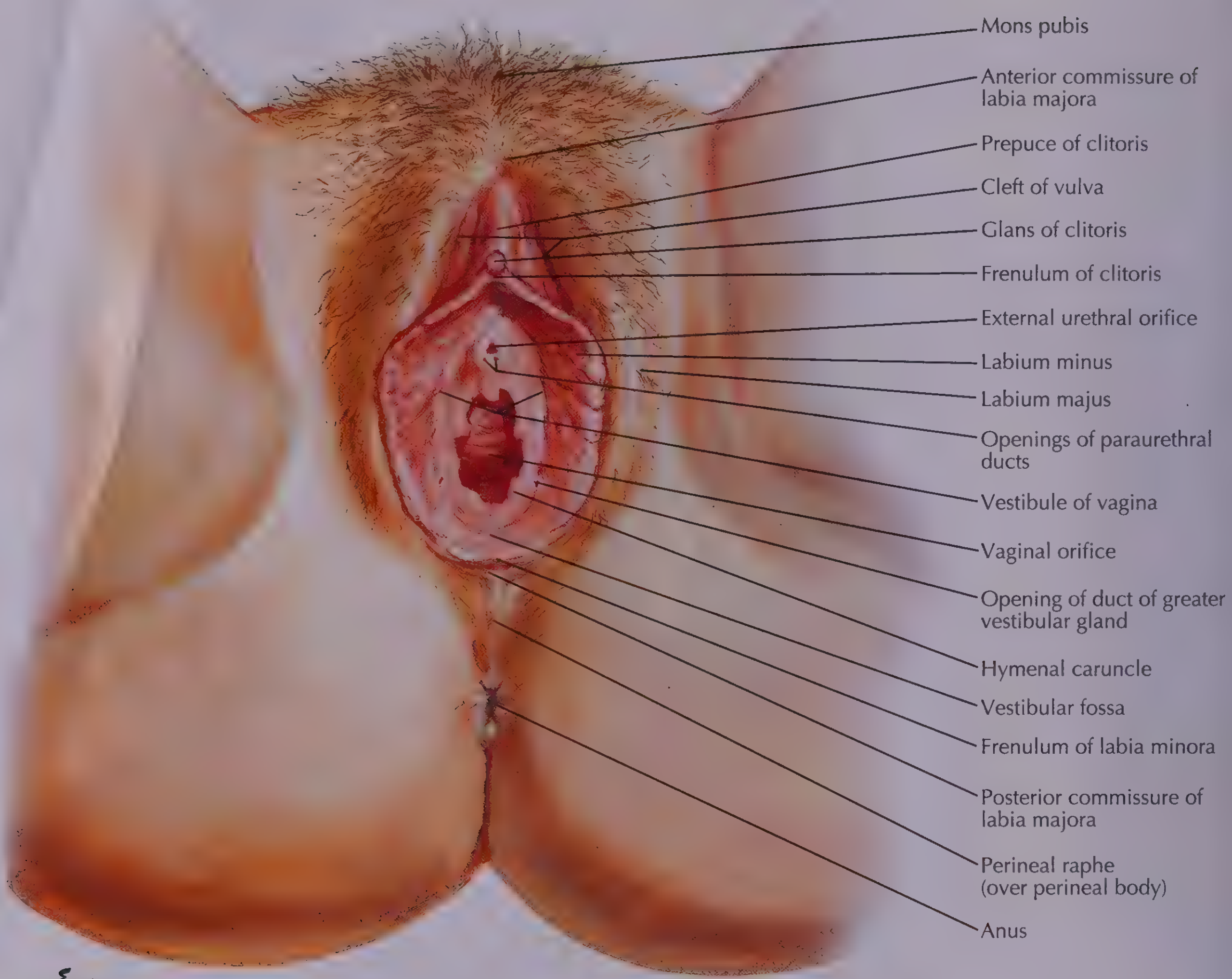
Anteroposterior fluoroscopic image obtained during hysterosalpingography



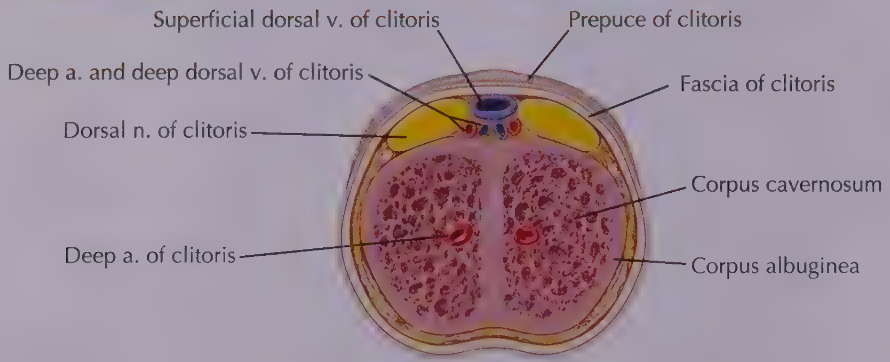
Contrast medium within uterine tubes
Contrast medium in pelvic cavity
Contrast medium within uterine cavity
Instrument cannulating external os of uterus

Female Perineum and External Genitalia

See also Plates 406, 409, 415, BP 91


Mons pubis
Anterior commissure of labia majora
Prepuce of clitoris
Cleft of vulva
Glans of clitoris
Frenulum of clitoris
External urethral orifice
Labium minus
Labium majus
Openings of paraurethral ducts
Vestibule of vagina
Vaginal orifice
Opening of duct of greater vestibular gland
Hymenal caruncle
Vestibular fossa
Frenulum of labia minora
Posterior commissure of labia majora
Perineal raphe (over perineal body)
Anus

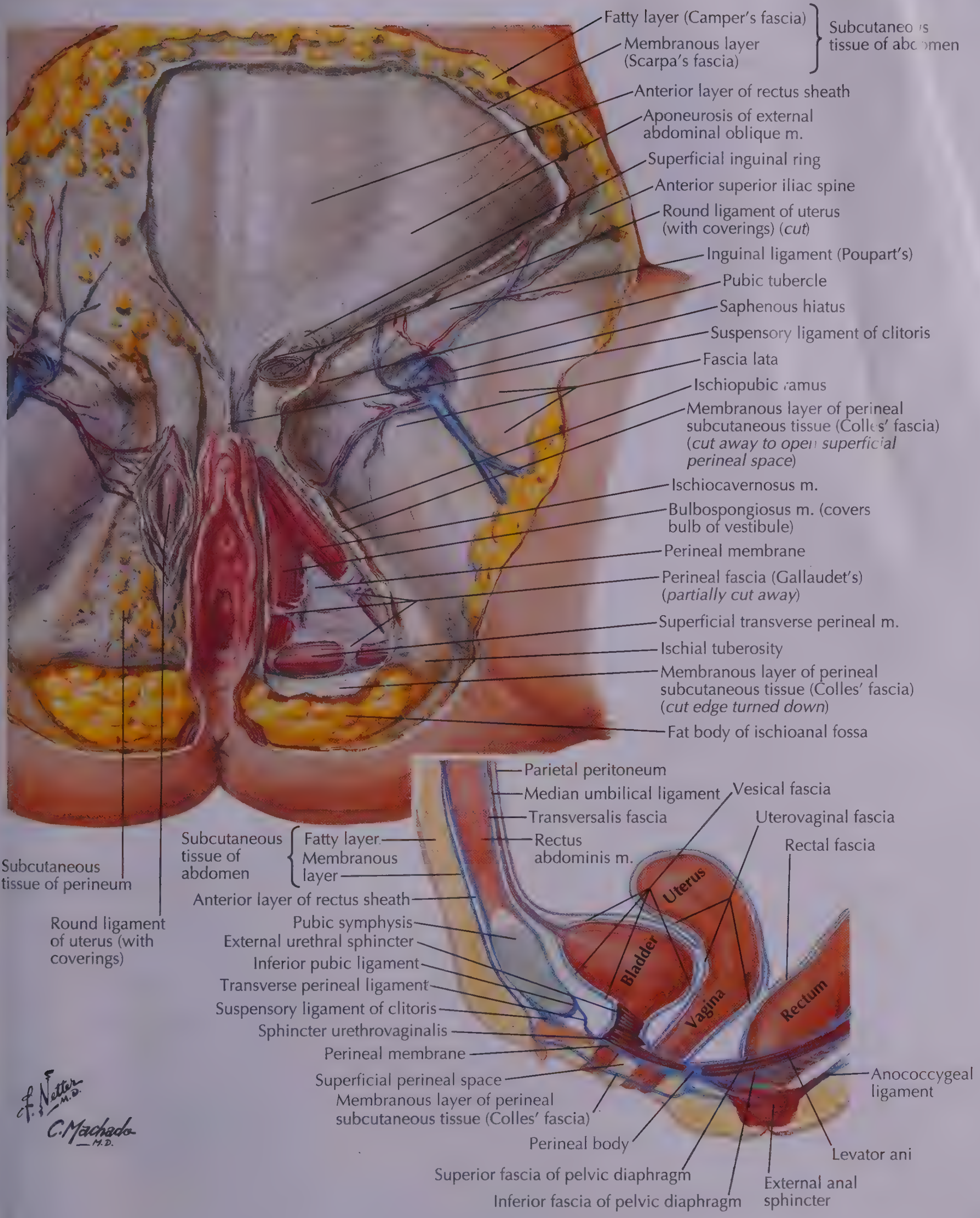
F. Netter M.D.


Superficial dorsal v. of clitoris
Prepuce of clitoris
Deep a. and deep dorsal v. of clitoris
Fascia of clitoris
Dorsal n. of clitoris
Corpus cavernosum
Deep a. of clitoris
Corpus albuginea

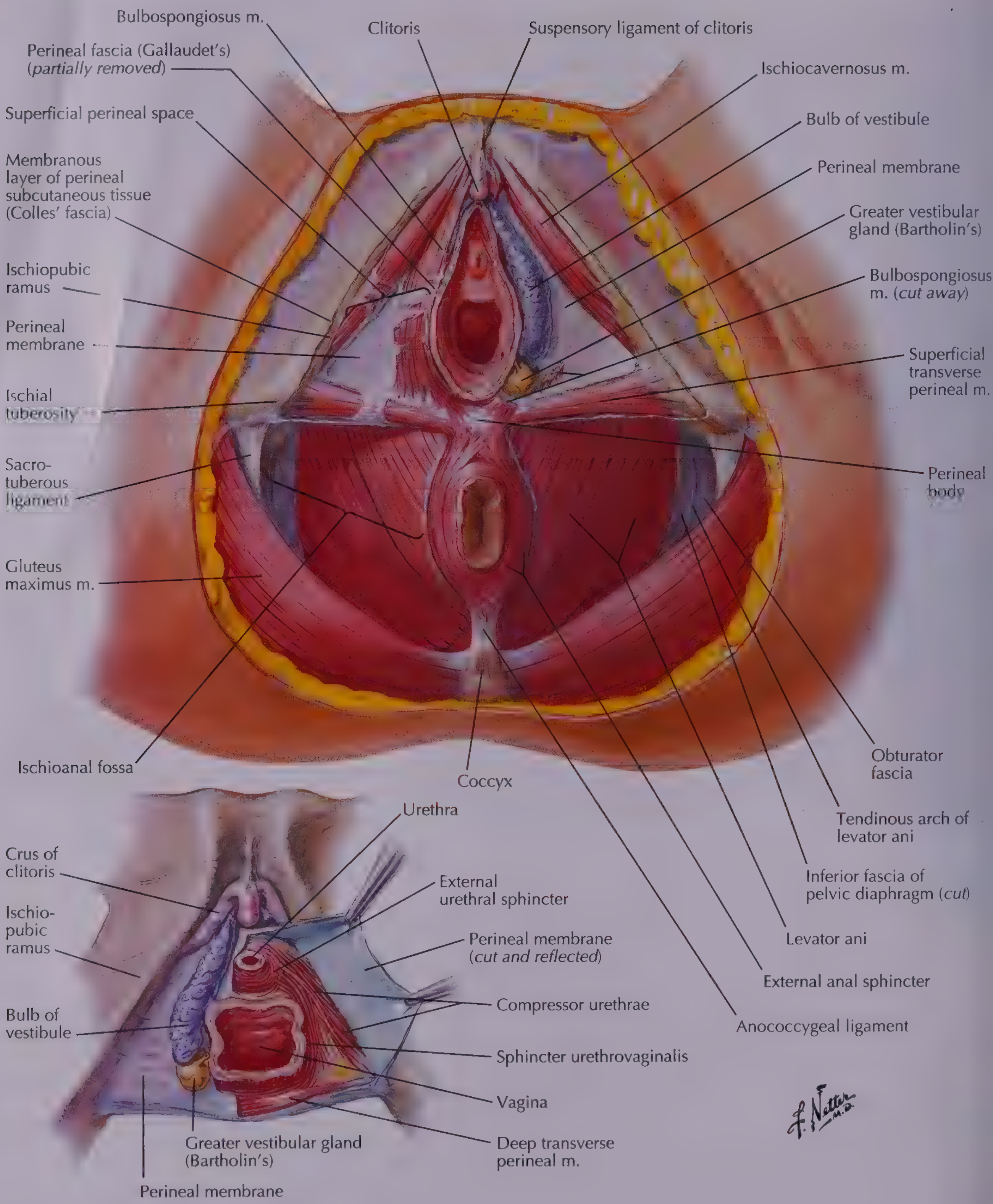
Transverse section through body of clitoris

Female Perineum (Superficial Dissection)

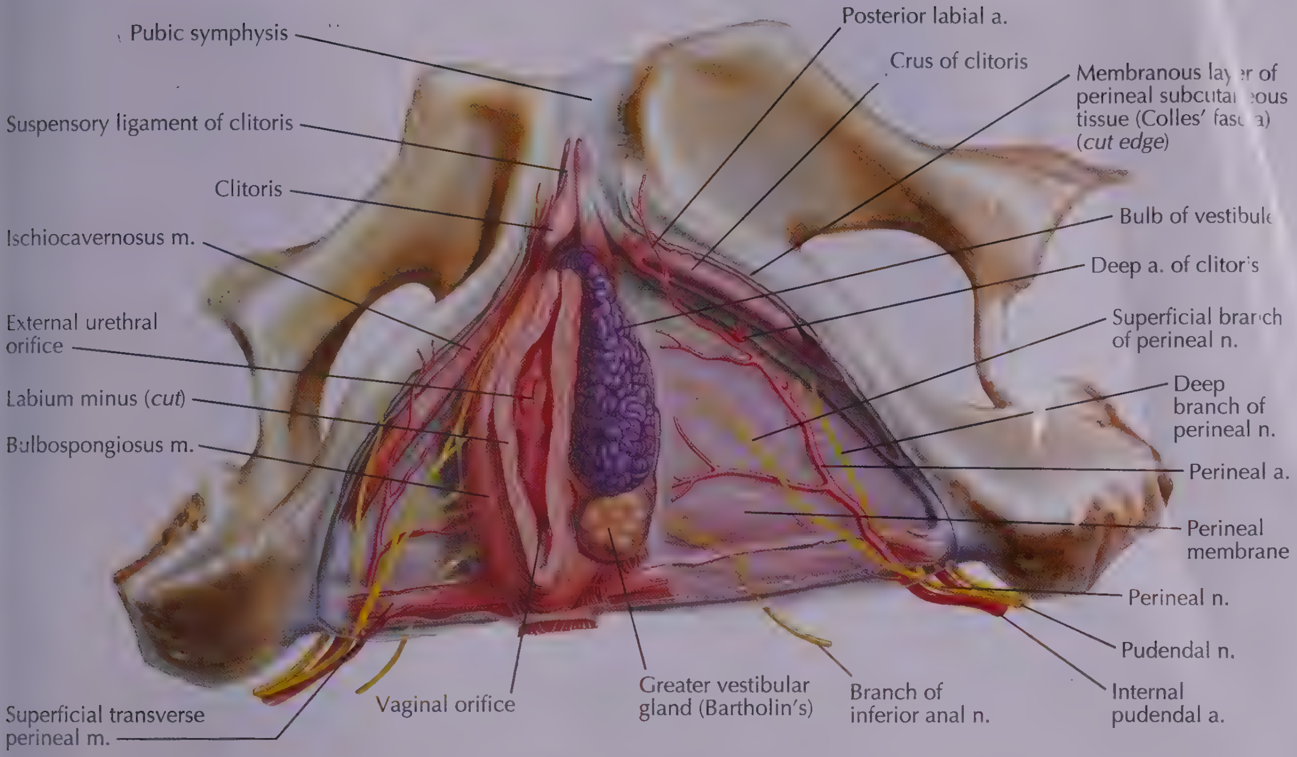
See also Plate BP 84


Fatty layer (Camper's fascia)
Membranous layer (Scarpa's fascia)
Subcutaneous tissue of abdomen
Anterior layer of rectus sheath
Aponeurosis of external abdominal oblique m.
Superficial inguinal ring
Anterior superior iliac spine
Round ligament of uterus (with coverings) (*cut*)
Inguinal ligament (Poupart's)
Pubic tubercle
Saphenous hiatus
Suspensory ligament of clitoris
Fascia lata
Ischiopubic ramus
Membranous layer of perineal subcutaneous tissue (Colles' fascia) (*cut away to open superficial perineal space*)
Ischiocavernosus m.
Bulbospongiosus m. (covers bulb of vestibule)
Perineal membrane
Perineal fascia (Gallaudet's) (*partially cut away*)
Superficial transverse perineal m.
Ischial tuberosity
Membranous layer of perineal subcutaneous tissue (Colles' fascia) (*cut edge turned down*)
Fat body of ischioanal fossa
Subcutaneous tissue of perineum
Round ligament of uterus (with coverings)
Parietal peritoneum
Median umbilical ligament
Vesical fascia
Transversalis fascia
Uterovaginal fascia
Rectal fascia
Rectus abdominis m.
Subcutaneous tissue of abdomen
Fatty layer
Membranous layer
Anterior layer of rectus sheath
Pubic symphysis
External urethral sphincter
Inferior pubic ligament
Transverse perineal ligament
Suspensory ligament of clitoris
Sphincter urethrovaginalis
Perineal membrane
Superficial perineal space
Membranous layer of perineal subcutaneous tissue (Colles' fascia)
Perineal body
Superior fascia of pelvic diaphragm
Inferior fascia of pelvic diaphragm
Uterus
Bladder
Vagina
Rectum
Anococcygeal ligament
Levator ani
External anal sphincter
F. Netter M.D.
C. Machado M.D.

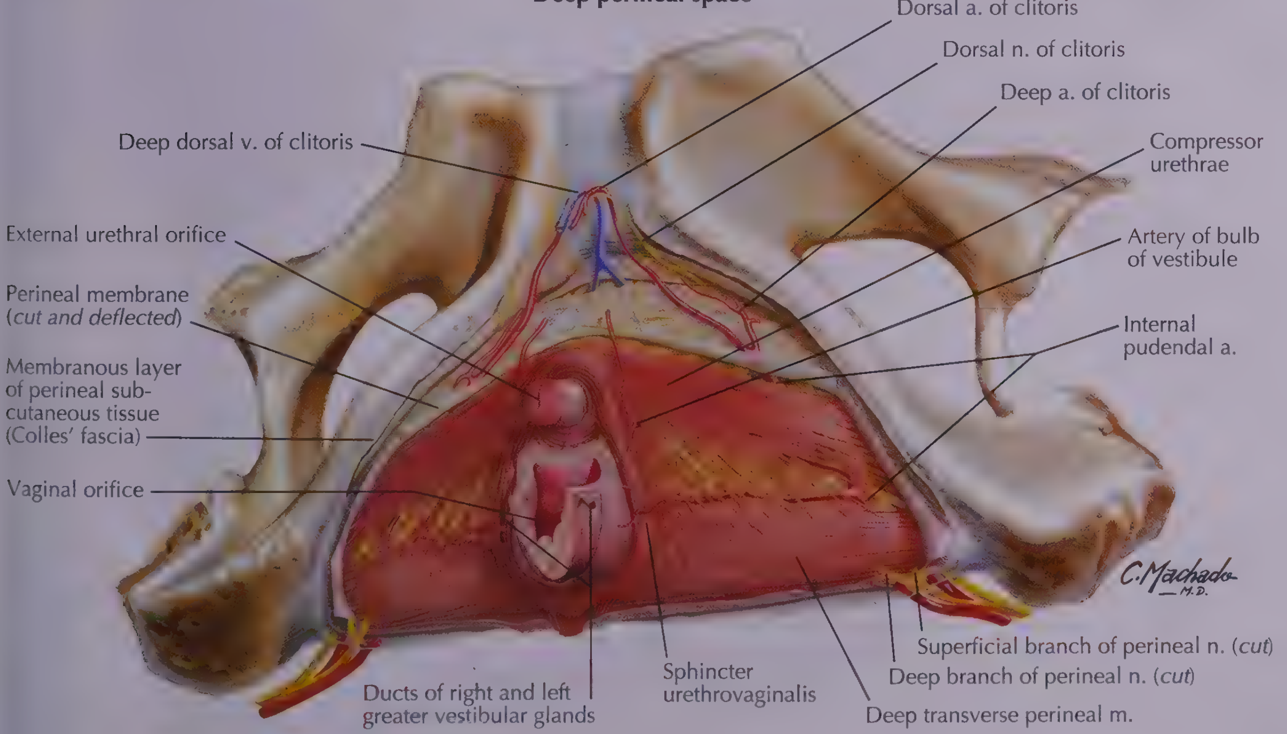
See also Plate BP 86


Bulbospongiosus m.
Perineal fascia (Gallaudet's) (*partially removed*)
Superficial perineal space
Membranous layer of perineal subcutaneous tissue (Colles' fascia)
Ischiopubic ramus
Perineal membrane
Ischial tuberosity
Sacrotuberous ligament
Gluteus maximus m.
Ischioanal fossa
Clitoris
Suspensory ligament of clitoris
Ischiocavernosus m.
Bulb of vestibule
Perineal membrane
Greater vestibular gland (Bartholin's)
Bulbospongiosus m. (*cut away*)
Superficial transverse perineal m.
Perineal body
Obturator fascia
Tendinous arch of levator ani
Inferior fascia of pelvic diaphragm (*cut*)
Levator ani
External anal sphincter
Anococcygeal ligament
Coccyx
Urethra
Crus of clitoris
Ischiopubic ramus
Bulb of vestibule
External urethral sphincter
Perineal membrane (*cut and reflected*)
Compressor urethrae
Sphincter urethrovaginalis
Vagina
Deep transverse perineal m.
Greater vestibular gland (Bartholin's)
Perineal membrane

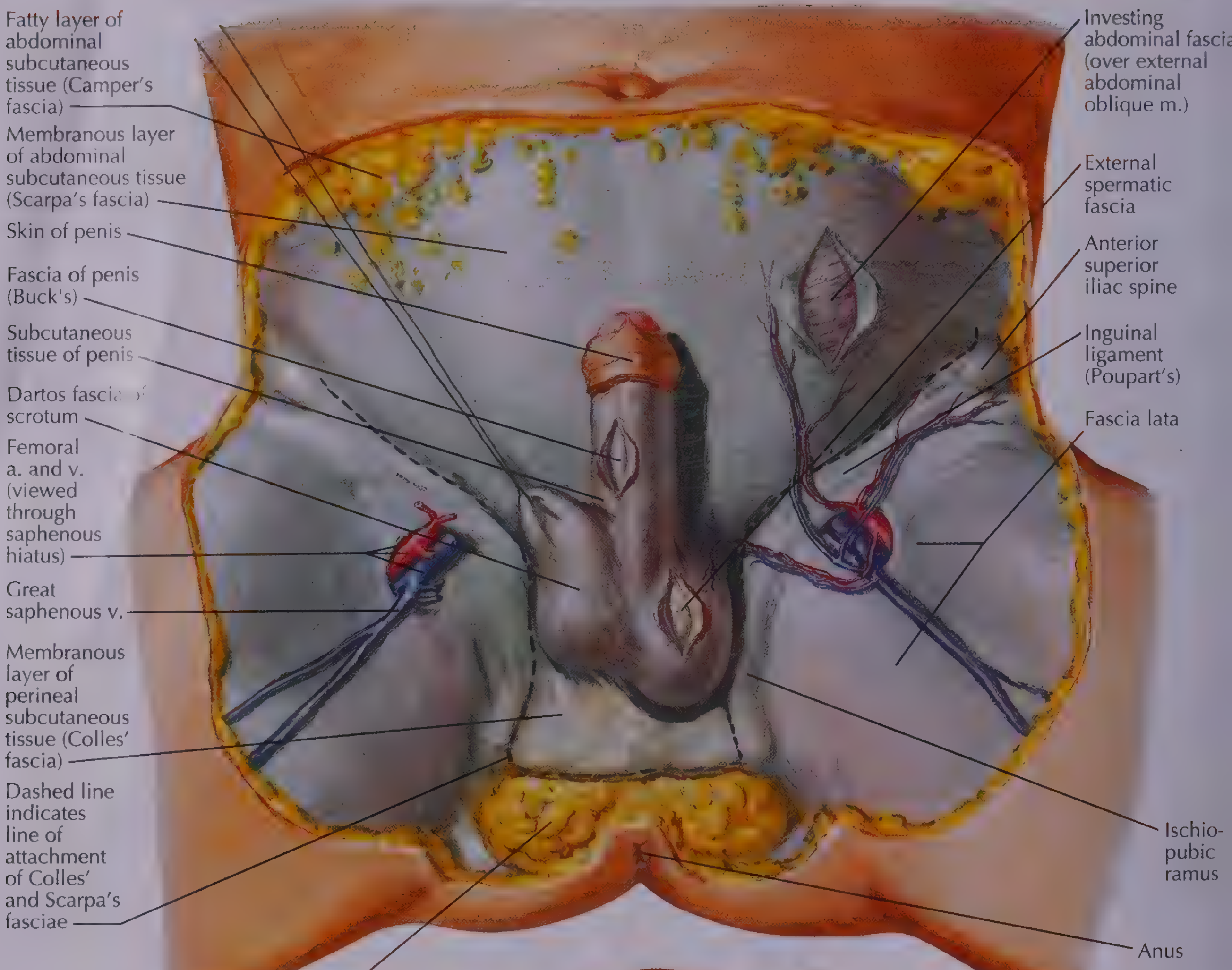
Superficial perineal space

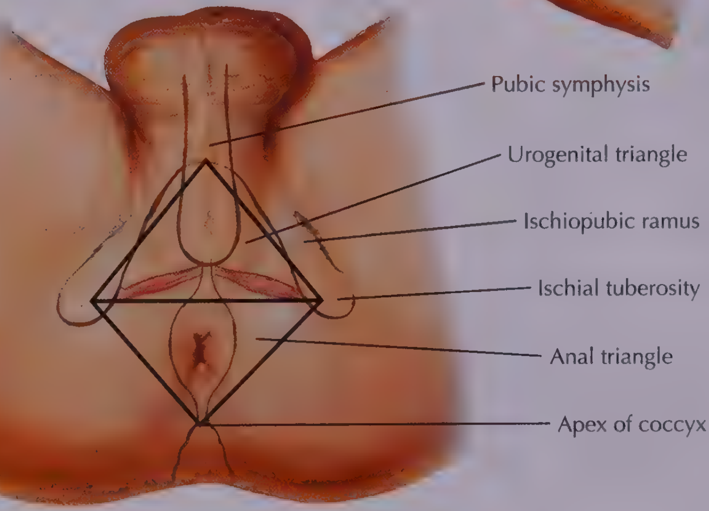

Pubic symphysis
Suspensory ligament of clitoris
Clitoris
Ischiocavernosus m.
External urethral orifice
Labium minus (*cut*)
Bulbospongiosus m.
Superficial transverse perineal m.
Vaginal orifice
Greater vestibular gland (Bartholin's)
Branch of inferior anal n.
Posterior labial a.
Crus of clitoris
Membranous layer of perineal subcutaneous tissue (Colles' fascia) (*cut edge*)
Bulb of vestibule
Deep a. of clitoris
Superficial branch of perineal n.
Deep branch of perineal n.
Perineal a.
Perineal membrane
Perineal n.
Pudendal n.
Internal pudendal a.

Deep perineal space


Dorsal a. of clitoris
Dorsal n. of clitoris
Deep a. of clitoris
Deep dorsal v. of clitoris
Compressor urethrae
External urethral orifice
Artery of bulb of vestibule
Perineal membrane (*cut and deflected*)
Internal pudendal a.
Membranous layer of perineal subcutaneous tissue (Colles' fascia)
Vaginal orifice
C.Machado M.D.
Superficial branch of perineal n. (*cut*)
Deep branch of perineal n. (*cut*)
Ducts of right and left greater vestibular glands
Sphincter urethrovaginalis
Deep transverse perineal m.

Male Perineum and External Genitalia (Superficial Dissection)

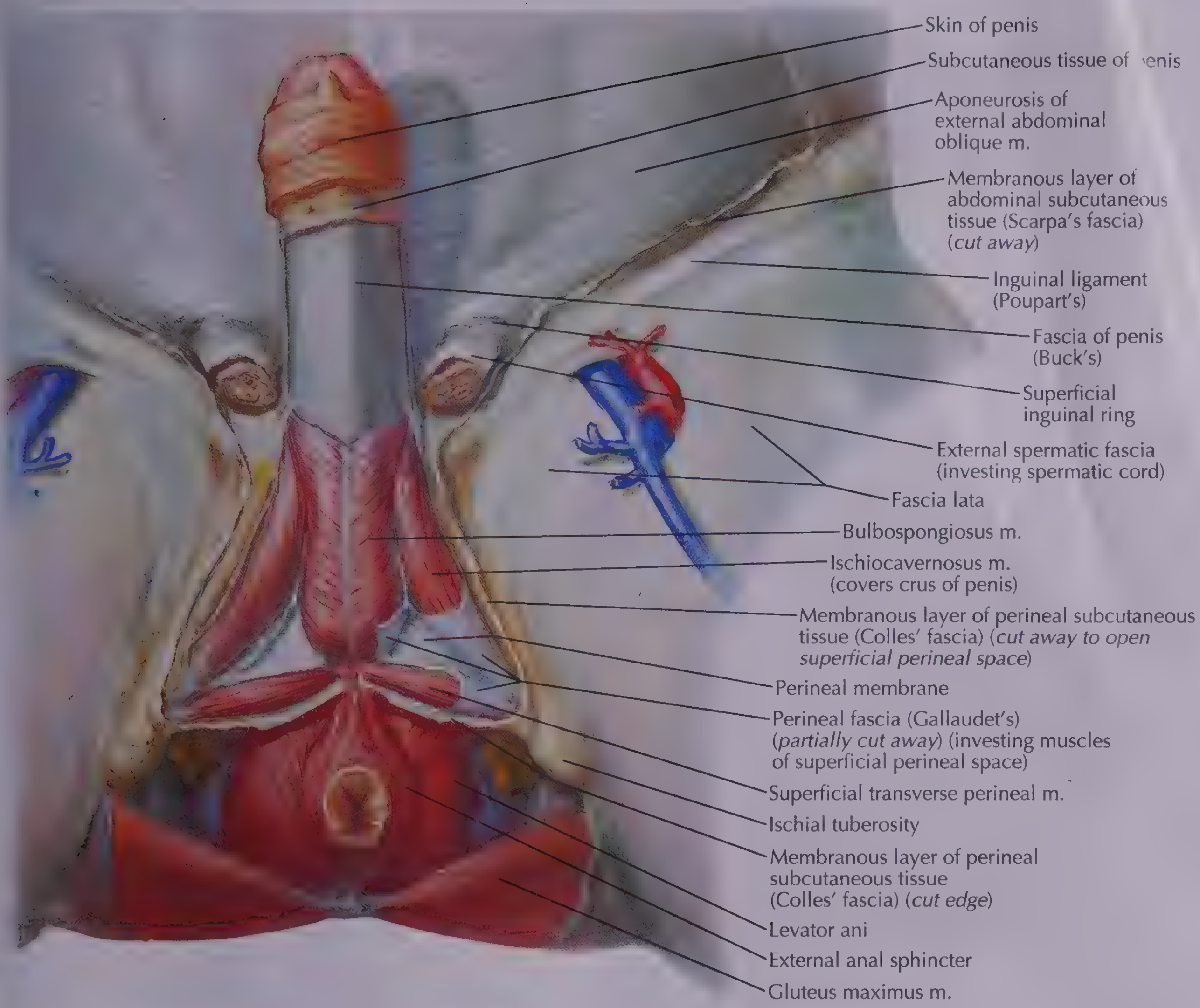

Fatty layer of abdominal subcutaneous tissue (Camper's fascia)
Membranous layer of abdominal subcutaneous tissue (Scarpa's fascia)
Skin of penis
Fascia of penis (Buck's)
Subcutaneous tissue of penis
Dartos fascia of scrotum
Femoral a. and v. (viewed through saphenous hiatus)
Great saphenous v.
Membranous layer of perineal subcutaneous tissue (Colles' fascia)
Dashed line indicates line of attachment of Colles' and Scarpa's fasciae
Fat body in ischioanal fossa
Investing abdominal fasci (over external abdominal oblique m.)
External spermatic fascia
Anterior superior iliac spine
Inguinal ligament (Poupart's)
Fascia lata
Ischio-pubic ramus
Anus

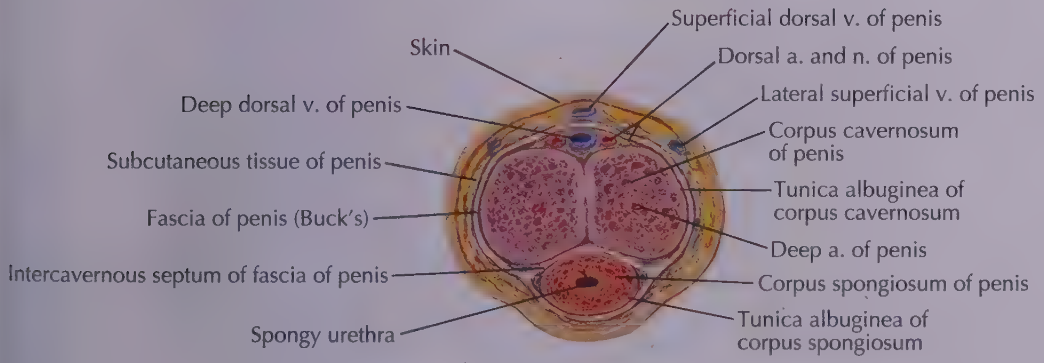

Pubic symphysis
Urogenital triangle
Ischiopubic ramus
Ischial tuberosity
Anal triangle
Apex of coccyx

Regions of perineum: surface topography

Male Perineum and External Genitalia (Deeper Dissection)

See also Plates 391, 403, 405, 407; BP 84


Skin of penis
Subcutaneous tissue of penis
Aponeurosis of external abdominal oblique m.
Membranous layer of abdominal subcutaneous tissue (Scarpa's fascia) (*cut away*)
Inguinal ligament (Poupart's)
Fascia of penis (Buck's)
Superficial inguinal ring
External spermatic fascia (investing spermatic cord)
Fascia lata
Bulbospongiosus m.
Ischiocavernosus m. (covers crus of penis)
Membranous layer of perineal subcutaneous tissue (Colles' fascia) (*cut away to open superficial perineal space*)
Perineal membrane
Perineal fascia (Gallaudet's) (*partially cut away*) (investing muscles of superficial perineal space)
Superficial transverse perineal m.
Ischial tuberosity
Membranous layer of perineal subcutaneous tissue (Colles' fascia) (*cut edge*)
Levator ani
External anal sphincter
Gluteus maximus m.

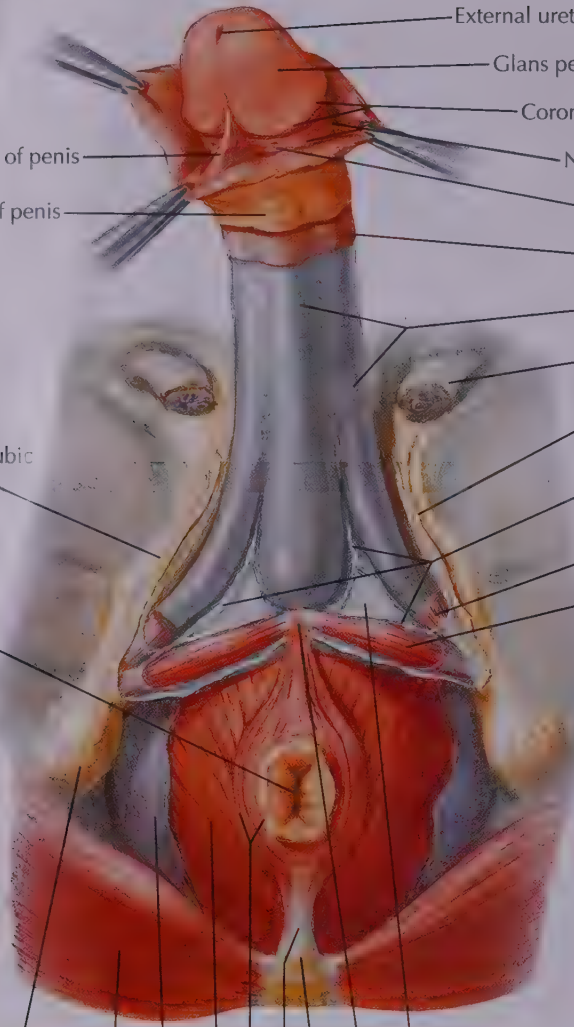

Superficial dorsal v. of penis
Skin
Dorsal a. and n. of penis
Deep dorsal v. of penis
Lateral superficial v. of penis
Subcutaneous tissue of penis
Corpus cavernosum of penis
Tunica albuginea of corpus cavernosum
Fascia of penis (Buck's)
Deep a. of penis
Intercavernous septum of fascia of penis
Corpus spongiosum of penis
Spongy urethra
Tunica albuginea of corpus spongiosum

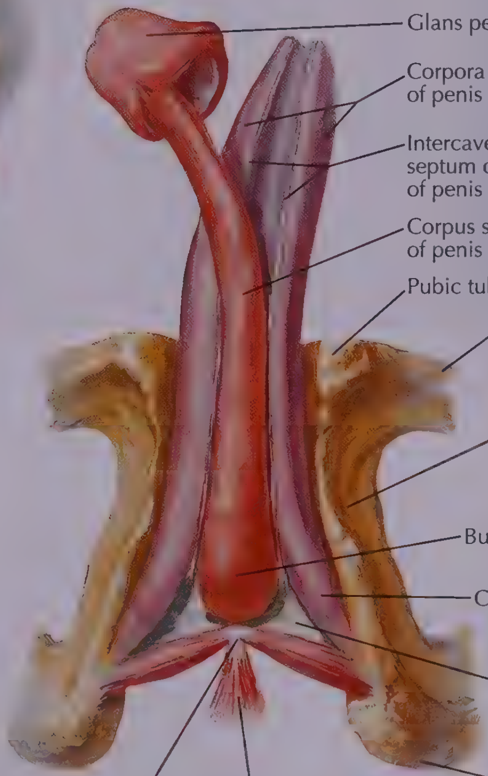
Transverse section through body of penis

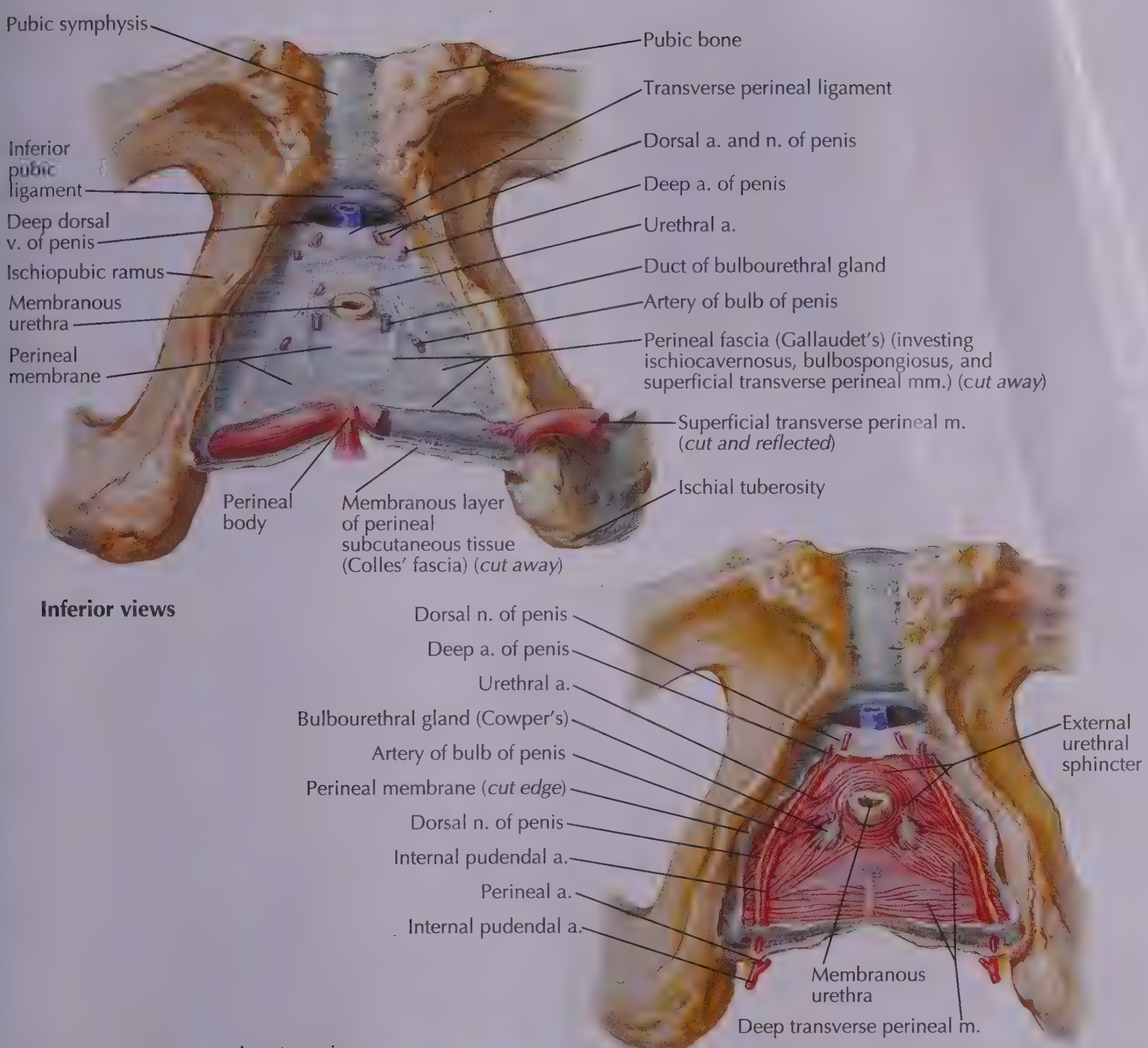
F. Netter M.D.

Penis

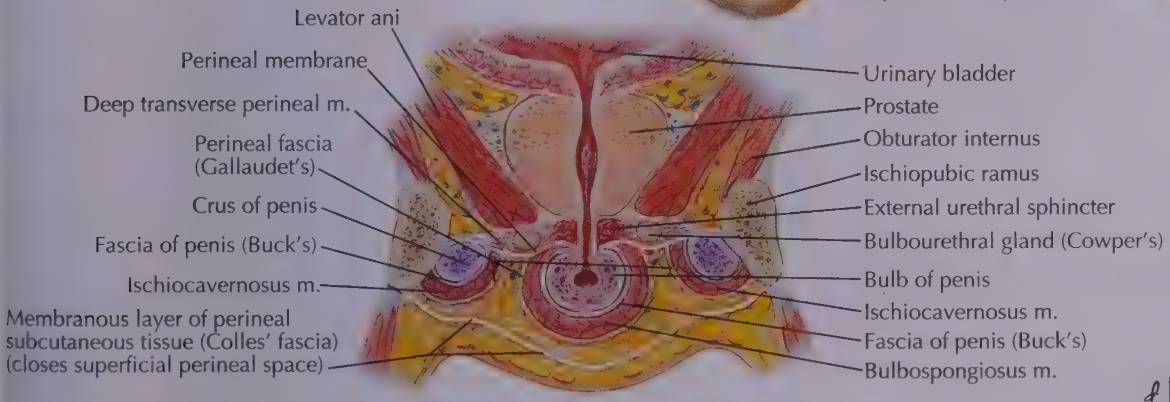
See also Plate [illegible]


External urethral orifice
Glans penis
Corona of glans penis
Frenulum of penis
Neck of glans penis
Skin of penis
Opening of preputial gland
Subcutaneous tissue of penis
Fascia of penis (Buck's)
External spermatic fascia (investing spermatic cord) (cut)
Membranous layer of perineal subcutaneous tissue (Colles' fascia) (cut away to open superficial perineal space
Ischiopubic ramus
Perineal fascia (Gallaudet's) (cut away) (investing muscles of superficial perineal space)
Ischiocavernosus m. (cut away)
Superficial transverse perineal m.
Anus
Ischial tuberosity
Perineal membrane
Gluteus maximus m.
Perineal body
Inferior fascia of pelvic diaphragm
Apex of coccyx
Levator ani
External anal sphincter
Anococcygeal ligament


Glans penis
Corpora cavernosa of penis
Intercavernous septum of fascia of penis
Corpus spongiosum of penis
Pubic tubercle
Superior pubic ramus
Ischiopubic ramus
Bulb of penis
Crus of penis
Perineal membrane
Ischial tuberosity
Perineal body
External anal sphincter


Pubic symphysis
Pubic bone
Transverse perineal ligament
Inferior pubic ligament
Dorsal a. and n. of penis
Deep a. of penis
Deep dorsal v. of penis
Urethral a.
Ischiopubic ramus
Duct of bulbourethral gland
Membranous urethra
Artery of bulb of penis
Perineal membrane
Perineal fascia (Gallaudet's) (investing ischiocavernosus, bulbospongiosus, and superficial transverse perineal mm.) (cut away)
Superficial transverse perineal m. (cut and reflected)
Ischial tuberosity
Perineal body
Membranous layer of perineal subcutaneous tissue (Colles' fascia) (cut away)
Dorsal n. of penis
Deep a. of penis
Urethral a.
Bulbourethral gland (Cowper's)
Artery of bulb of penis
Perineal membrane (cut edge)
Dorsal n. of penis
Internal pudendal a.
Perineal a.
Internal pudendal a.
External urethral sphincter
Membranous urethra
Deep transverse perineal m.

Inferior views

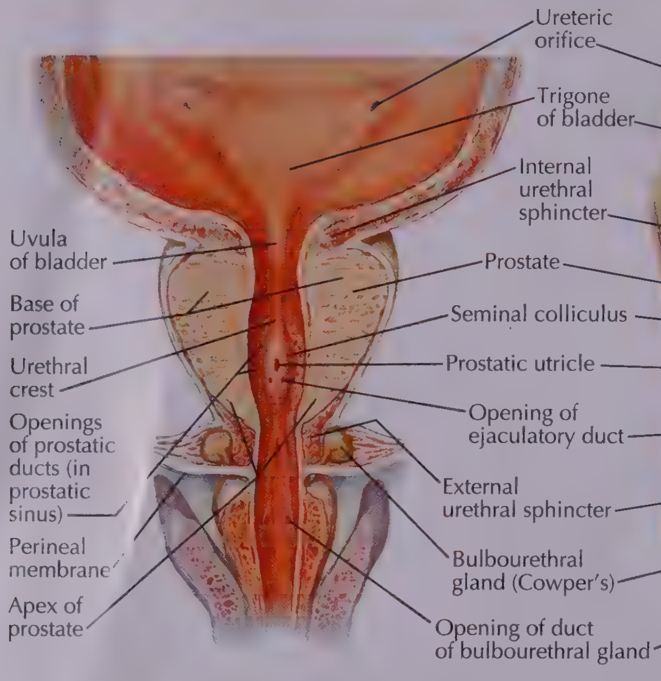

Levator ani
Perineal membrane
Deep transverse perineal m.
Perineal fascia (Gallaudet's)
Crus of penis
Fascia of penis (Buck's)
Ischiocavernosus m.
Membranous layer of perineal subcutaneous tissue (Colles' fascia) (closes superficial perineal space)
Urinary bladder
Prostate
Obturator internus
Ischiopubic ramus
External urethral sphincter
Bulbourethral gland (Cowper's)
Bulb of penis
Ischiocavernosus m.
Fascia of penis (Buck's)
Bulbospongiosus m.

Frontal section, anterior view of perineum: schema

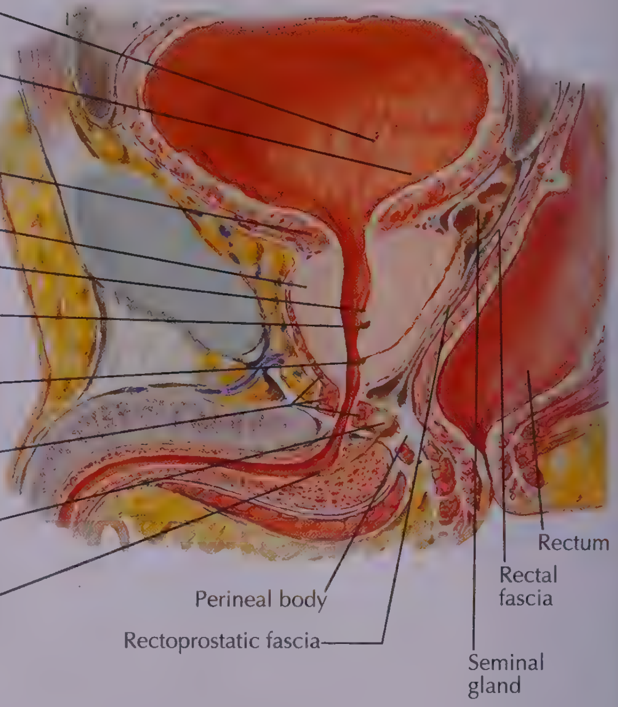
F. Netter M.D.
C. Machado M.D.

Prostate and Seminal Gland

See also Plates 368, 371, 405, BP 93

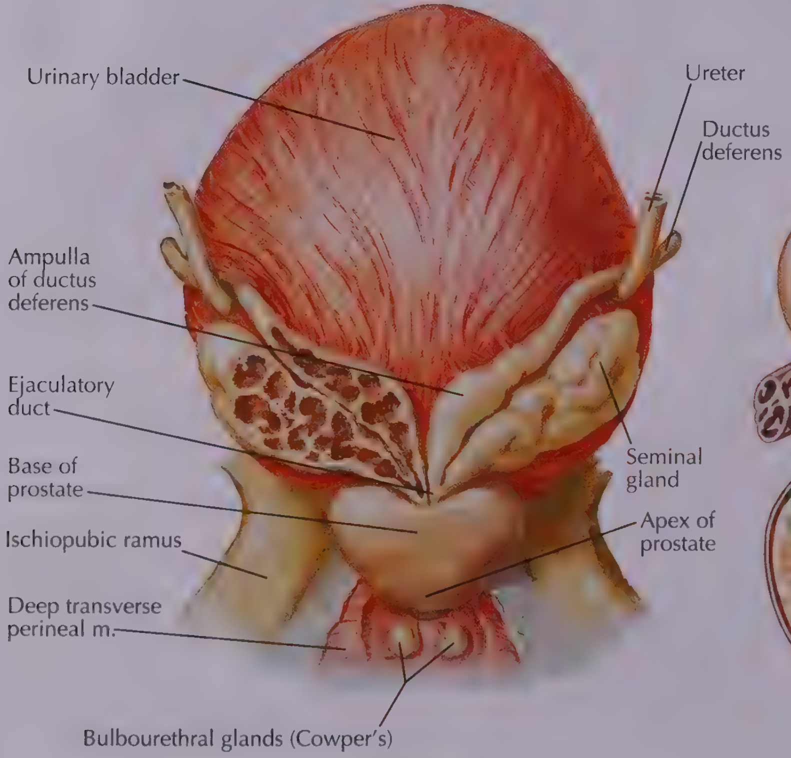

Ureteric orifice
Trigone of bladder
Internal urethral sphincter
Uvula of bladder
Prostate
Base of prostate
Seminal colliculus
Urethral crest
Prostatic utricle
Openings of prostatic ducts (in prostatic sinus)
Opening of ejaculatory duct
External urethral sphincter
Perineal membrane
Bulbourethral gland (Cowper's)
Apex of prostate
Opening of duct of bulbourethral gland

Anterior view of coronal section


Rectum
Rectal fascia
Perineal body
Rectoprostatic fascia
Seminal gland

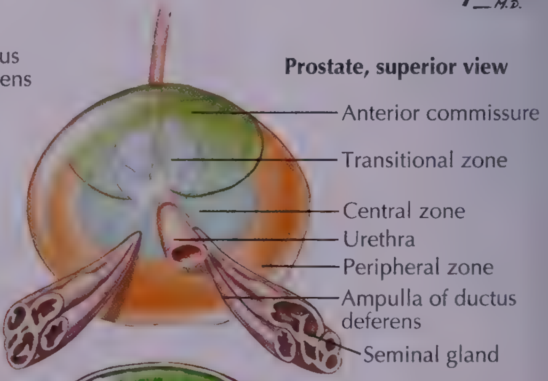
Sagittal section

F. Netter M.D.
C. Machado M.D.

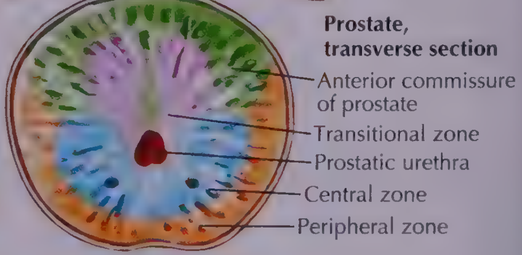

Urinary bladder
Ureter
Ductus deferens
Ampulla of ductus deferens
Ejaculatory duct
Seminal gland
Base of prostate
Apex of prostate
Ischiopubic ramus
Deep transverse perineal m.
Bulbourethral glands (Cowper's)

Posterior view

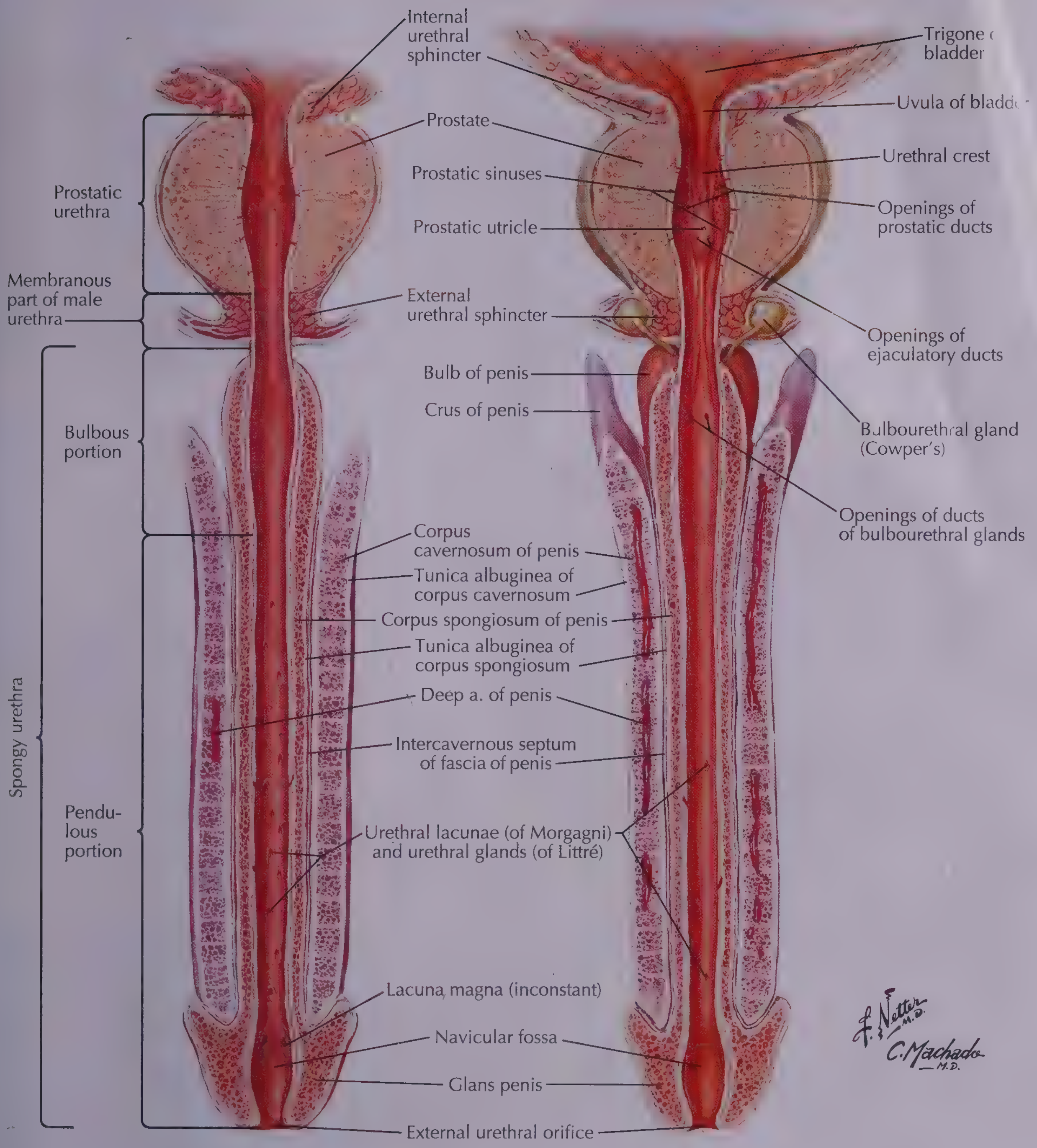
Prostate, superior view


Anterior commissure
Transitional zone
Central zone
Urethra
Peripheral zone
Ampulla of ductus deferens
Seminal gland

Prostate, transverse section


Anterior commissure of prostate
Transitional zone
Prostatic urethra
Central zone
Peripheral zone

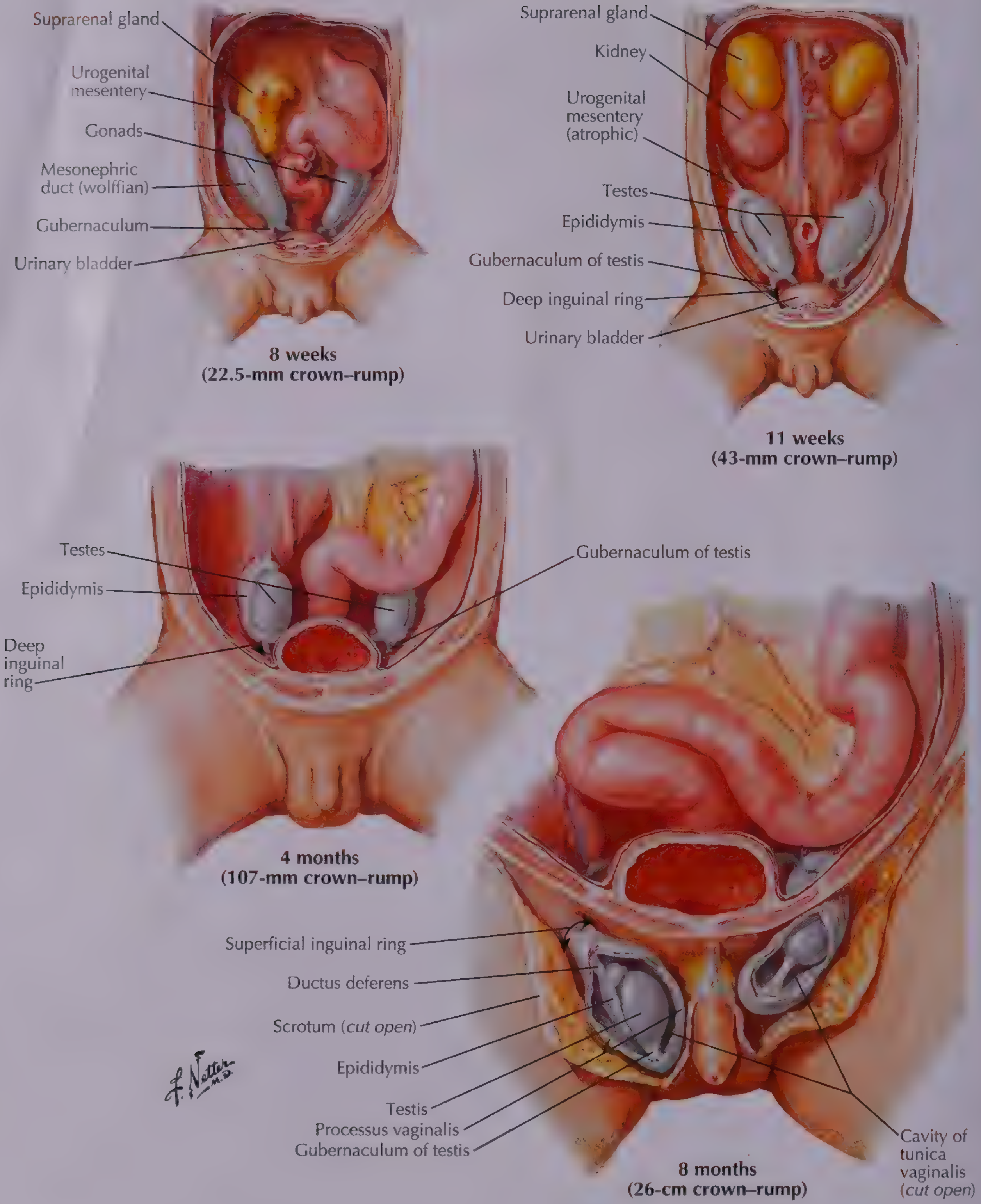
See also Plates 39, BP 92


Internal urethral sphincter
Trigone (bladder
Uvula of bladd
Prostate
Urethral crest
Prostatic sinuses
Openings of prostatic ducts
Prostatic utricle
Prostatic urethra
Membranous part of male urethra
External urethral sphincter
Openings of ejaculatory ducts
Bulb of penis
Crus of penis
Bulbous portion
Bulbourethral gland (Cowper's)
Openings of ducts of bulbourethral glands
Corpus cavernosum of penis
Tunica albuginea of corpus cavernosum
Corpus spongiosum of penis
Tunica albuginea of corpus spongiosum
Spongy urethra
Deep a. of penis
Intercavernous septum of fascia of penis
Pendulous portion
Urethral lacunae (of Morgagni) and urethral glands (of Littré)
Lacuna magna (inconstant)
Navicular fossa
Glans penis
External urethral orifice
F. Netter M.D.
C. Machado M.D.

Roof of urethra

Floor of urethra

Descent of Testis


Suprarenal gland
Urogenital mesentery
Gonads
Mesonephric duct (wolffian)
Gubernaculum
Urinary bladder
Suprarenal gland
Kidney
Urogenital mesentery (atrophic)
Testes
Epididymis
Gubernaculum of testis
Deep inguinal ring
Urinary bladder
Testes
Epididymis
Deep inguinal ring
Gubernaculum of testis
Superficial inguinal ring
Ductus deferens
Scrotum (*cut open*)
Epididymis
Testis
Processus vaginalis
Gubernaculum of testis
Cavity of tunica vaginalis (*cut open*)

8 weeks
(22.5-mm crown–rump)

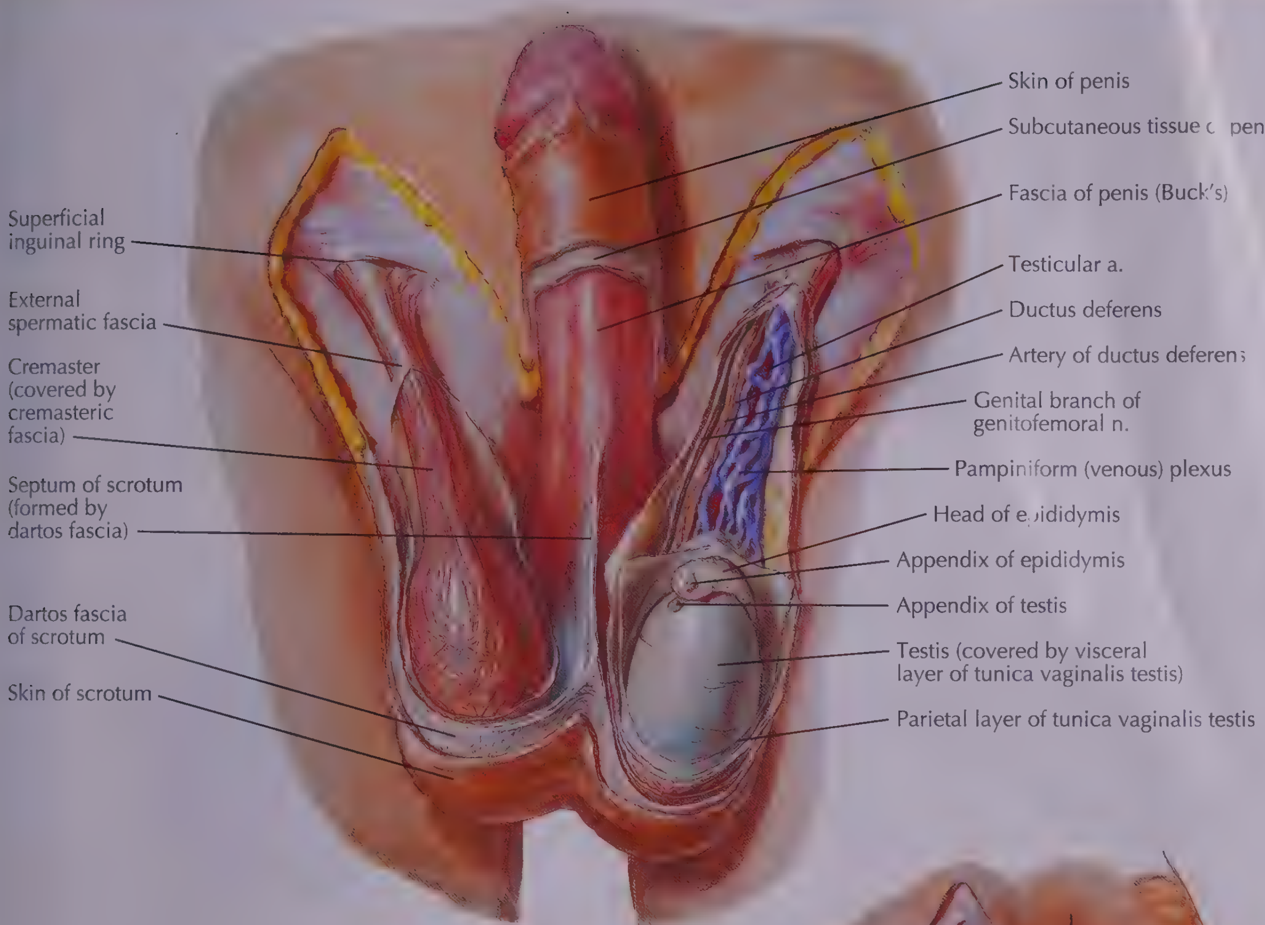
11 weeks
(43-mm crown–rump)

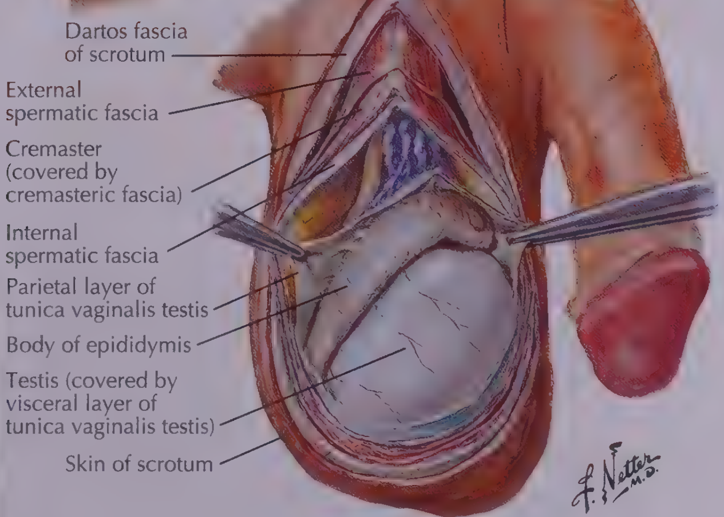
4 months
(107-mm crown–rump)

8 months
(26-cm crown–rump)

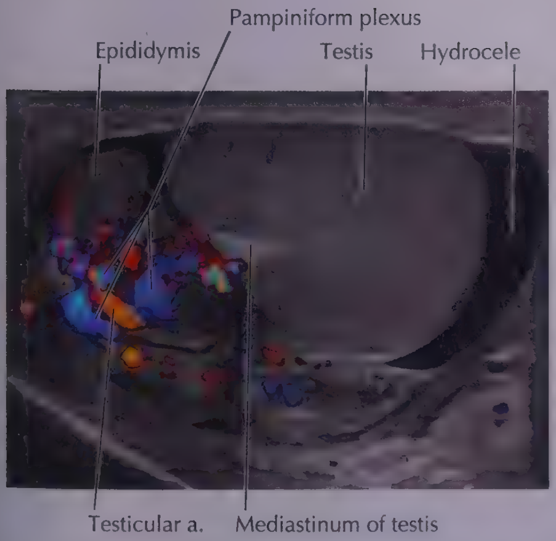
Scrotum and Contents

See also Plates 343, 368

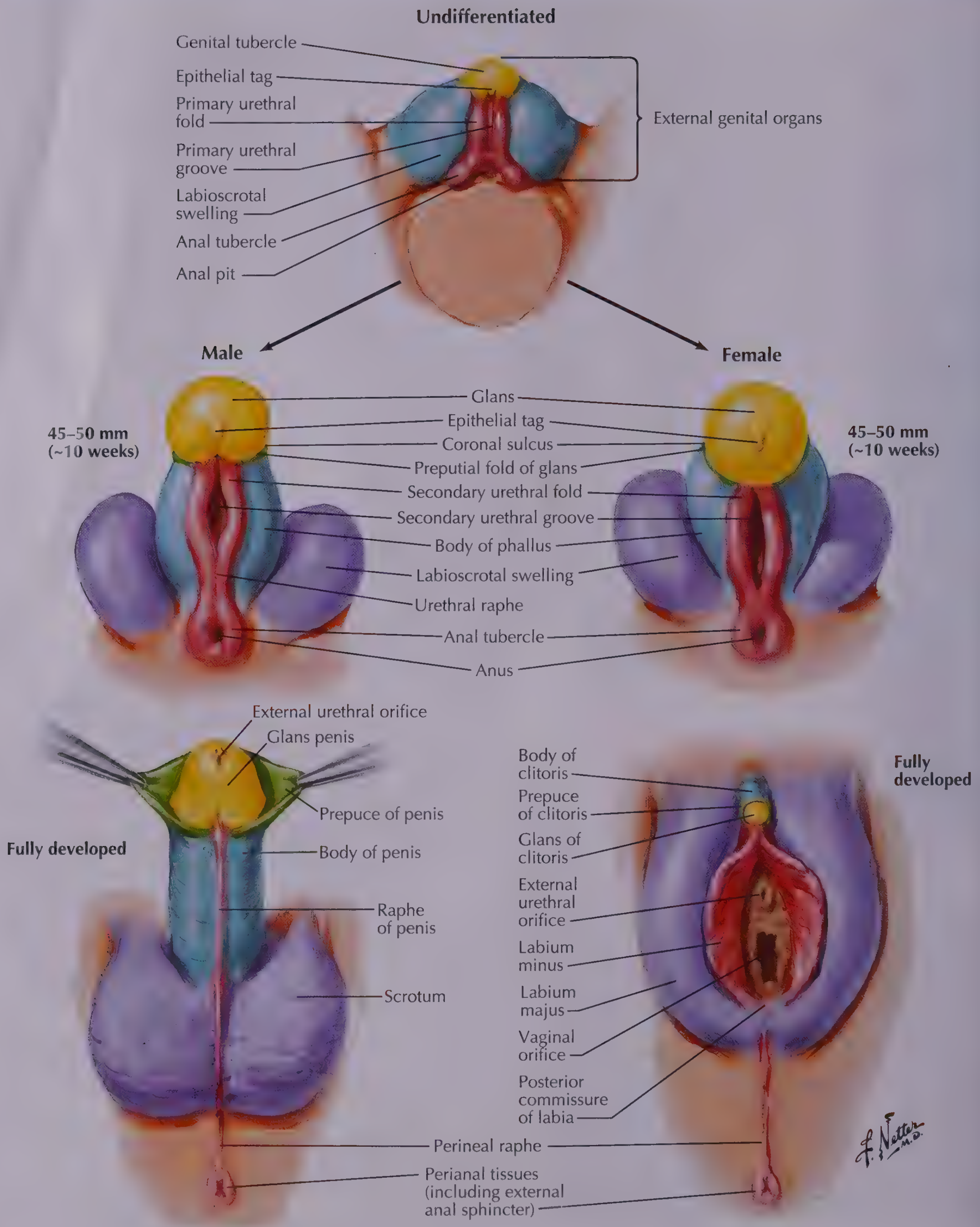

Skin of penis
Subcutaneous tissue of penis
Fascia of penis (Buck's)
Testicular a.
Ductus deferens
Artery of ductus deferens
Genital branch of genitofemoral n.
Pampiniform (venous) plexus
Head of epididymis
Appendix of epididymis
Appendix of testis
Testis (covered by visceral layer of tunica vaginalis testis)
Parietal layer of tunica vaginalis testis
Superficial inguinal ring
External spermatic fascia
Cremaster (covered by cremasteric fascia)
Septum of scrotum (formed by dartos fascia)
Dartos fascia of scrotum
Skin of scrotum

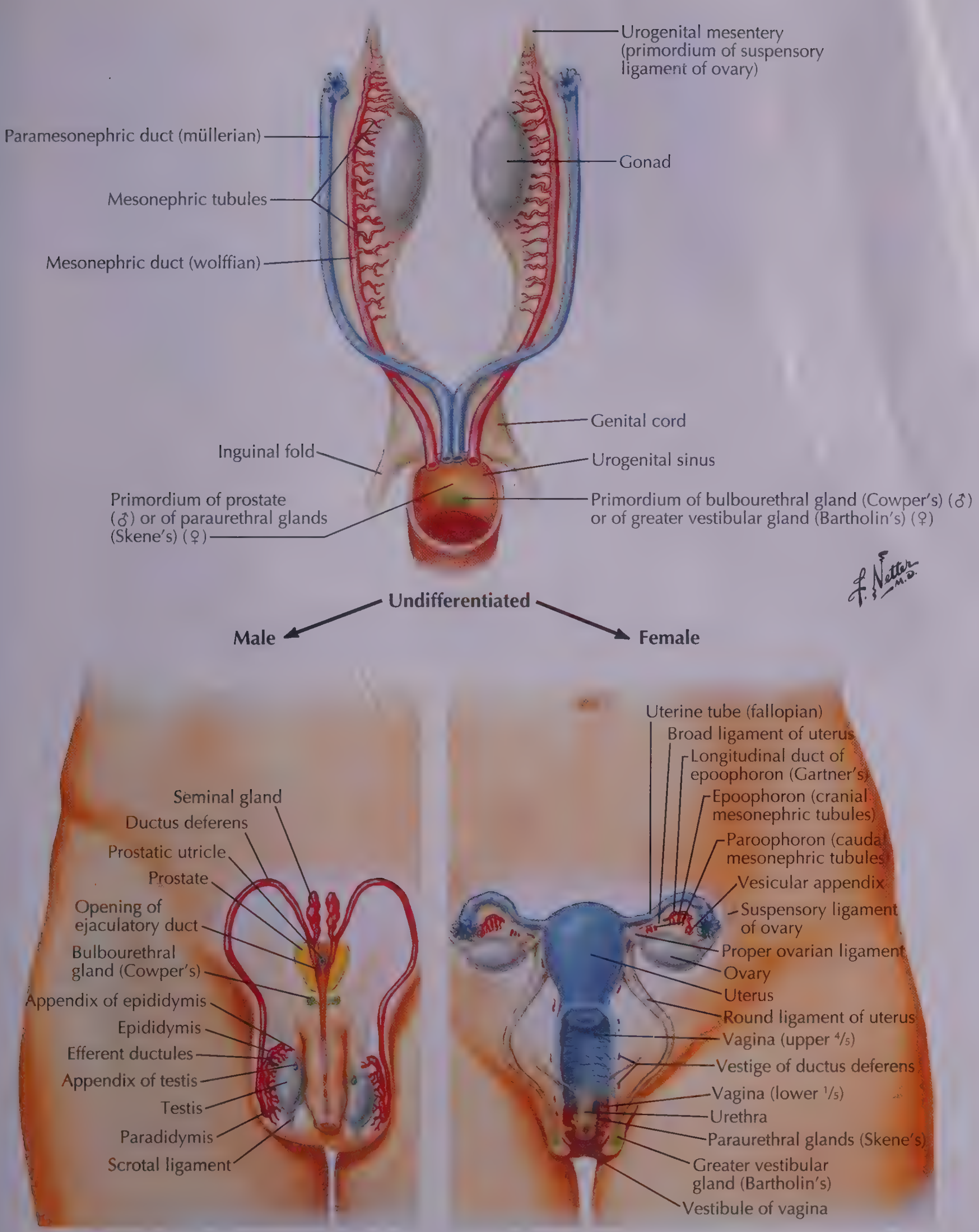

Dartos fascia of scrotum
External spermatic fascia
Cremaster (covered by cremasteric fascia)
Internal spermatic fascia
Parietal layer of tunica vaginalis testis
Body of epididymis
Testis (covered by visceral layer of tunica vaginalis testis)
Skin of scrotum
F. Netter M.D.

Color Doppler ultrasound: transverse view of testis

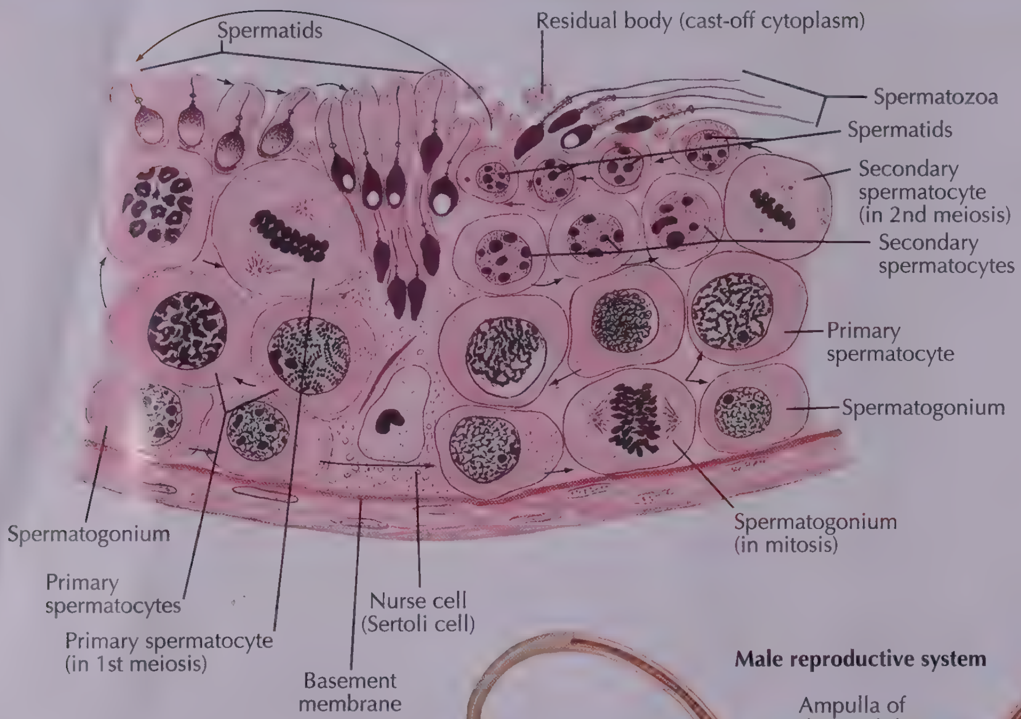

Pampiniform plexus
Epididymis
Testis
Hydrocele
Testicular a.
Mediastinum of testis

See also Plates 377, 381

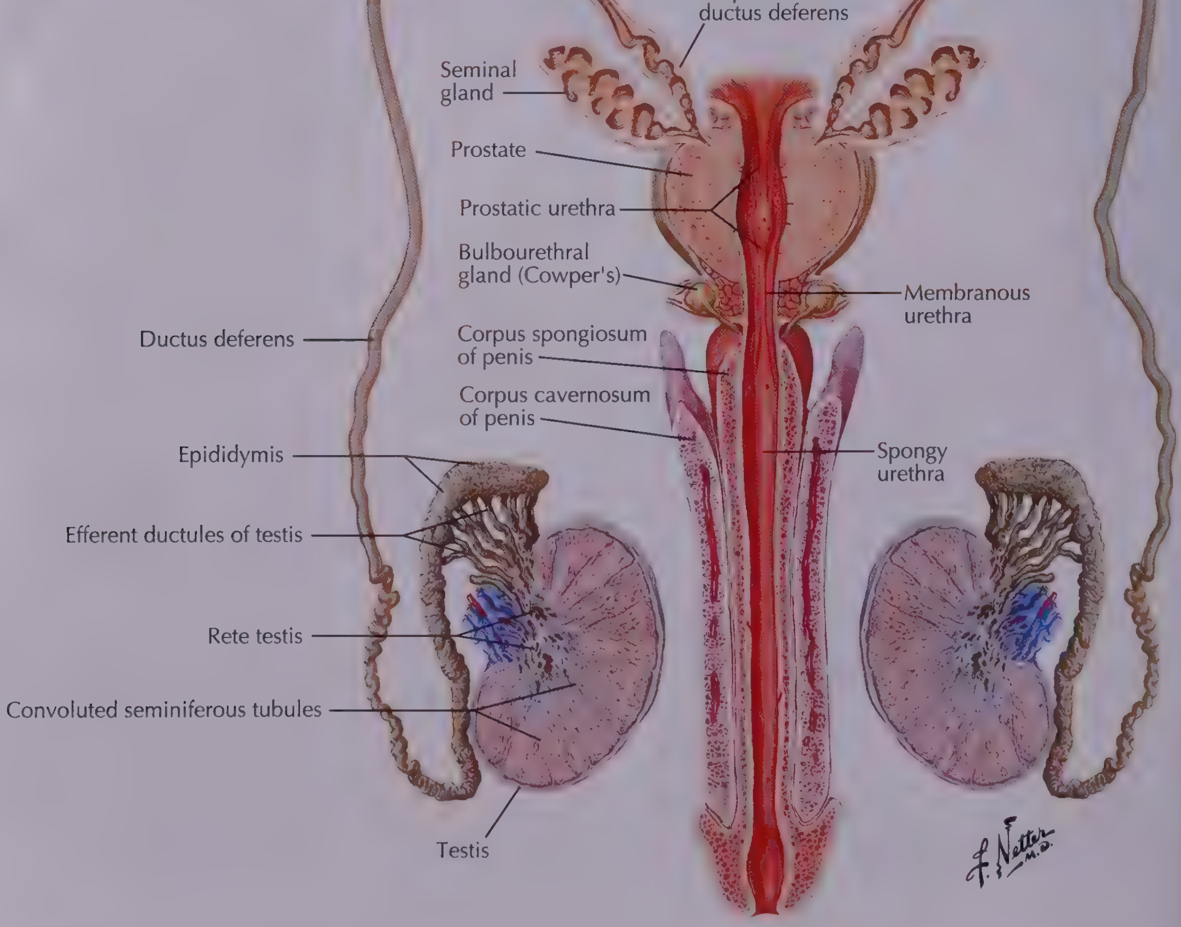

Undifferentiated
Genital tubercle
Epithelial tag
Primary urethral fold
Primary urethral groove
Labioscrotal swelling
Anal tubercle
Anal pit
External genital organs
Male
Female
45–50 mm (~10 weeks)
45–50 mm (~10 weeks)
Glans
Epithelial tag
Coronal sulcus
Preputial fold of glans
Secondary urethral fold
Secondary urethral groove
Body of phallus
Labioscrotal swelling
Urethral raphe
Anal tubercle
Anus
External urethral orifice
Glans penis
Prepuce of penis
Fully developed
Body of penis
Raphe of penis
Scrotum
Body of clitoris
Prepuce of clitoris
Glans of clitoris
External urethral orifice
Labium minus
Labium majus
Vaginal orifice
Posterior commissure of labia
Fully developed
Perineal raphe
Perianal tissues (including external anal sphincter)
F. Netter M.D.

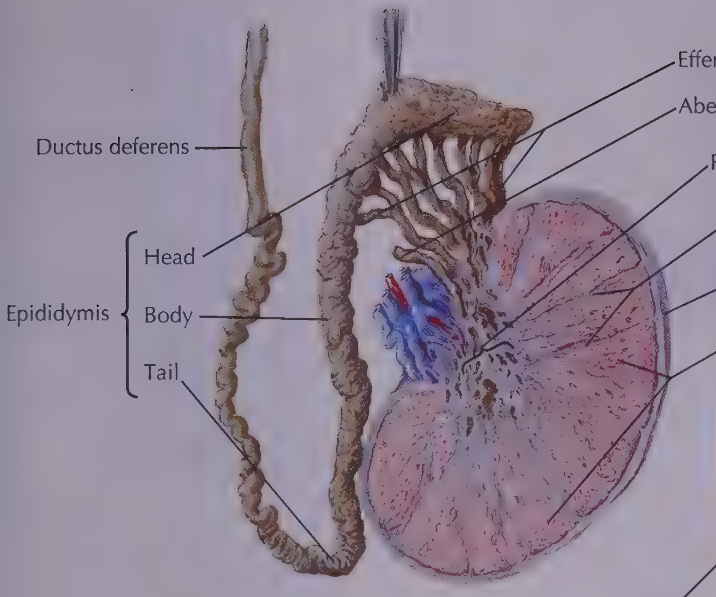

Urogenital mesentery (primordium of suspensory ligament of ovary)
Paramesonephric duct (müllerian)
Gonad
Mesonephric tubules
Mesonephric duct (wolffian)
Genital cord
Inguinal fold
Urogenital sinus
Primordium of prostate (♂) or of paraurethral glands (Skene's) (♀)
Primordium of bulbourethral gland (Cowper's) (♂) or of greater vestibular gland (Bartholin's) (♀)
Undifferentiated
Male
Female
Seminal gland
Ductus deferens
Prostatic utricle
Prostate
Opening of ejaculatory duct
Bulbourethral gland (Cowper's)
Appendix of epididymis
Epididymis
Efferent ductules
Appendix of testis
Testis
Paradidymis
Scrotal ligament
Uterine tube (fallopian)
Broad ligament of uterus
Longitudinal duct of epoophoron (Gartner's)
Epoophoron (cranial mesonephric tubules)
Paroophoron (caudal mesonephric tubules)
Vesicular appendix
Suspensory ligament of ovary
Proper ovarian ligament
Ovary
Uterus
Round ligament of uterus
Vagina (upper $^{4}/_{5}$)
Vestige of ductus deferens
Vagina (lower $^{1}/_{5}$)
Urethra
Paraurethral glands (Skene's)
Greater vestibular gland (Bartholin's)
Vestibule of vagina

Spermatogenic epithelium: spermatogenesis

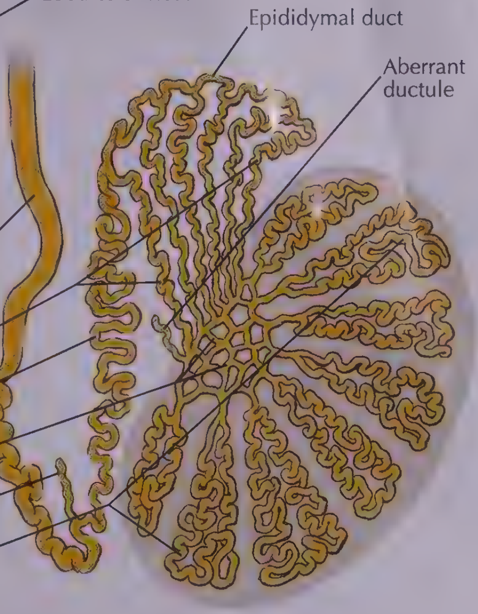

Spermatids
Residual body (cast-off cytoplasm)
Spermatozoa
Spermatids
Secondary spermatocyte (in 2nd meiosis)
Secondary spermatocytes
Primary spermatocyte
Spermatogonium
Spermatogonium (in mitosis)
Spermatogonium
Primary spermatocytes
Primary spermatocyte (in 1st meiosis)
Nurse cell (Sertoli cell)
Basement membrane

Male reproductive system

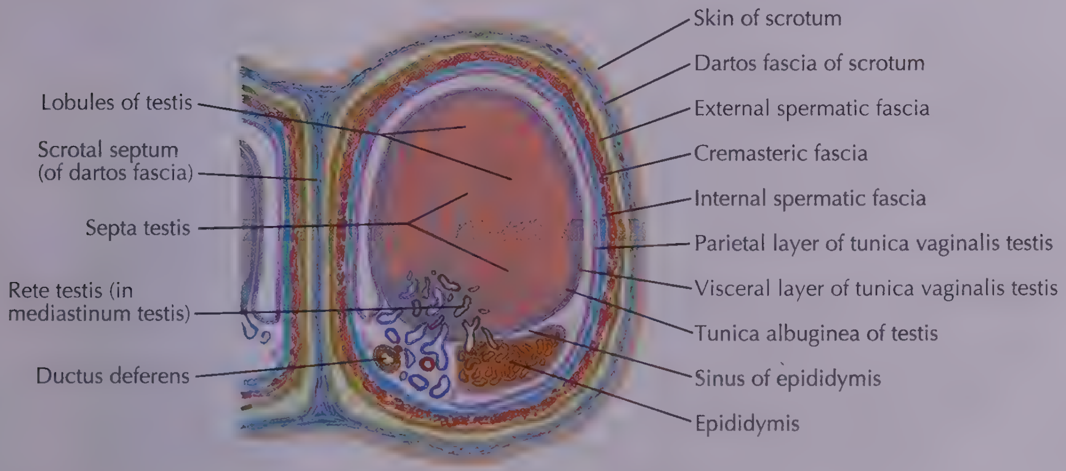

Ampulla of ductus deferens
Seminal gland
Prostate
Prostatic urethra
Bulbourethral gland (Cowper's)
Membranous urethra
Ductus deferens
Corpus spongiosum of penis
Corpus cavernosum of penis
Spongy urethra
Epididymis
Efferent ductules of testis
Rete testis
Convoluted seminiferous tubules
Testis
F. Netter M.D.


Efferent ductules
Aberrant ductule (vestigial mesonephric tubule)
Rete testis (in mediastinum testis)
Septa testis
Tunica albuginea of testis
Lobules of testis
Ductus deferens
Epididymis
Head
Body
Tail

Coronal section


Epididymal duct
Aberrant ductule
Ductus deferens
Efferent ductules
Epididymal duct
Rete testis (in mediastinum testis)
Aberrant ductule
Convoluted seminiferous tubules

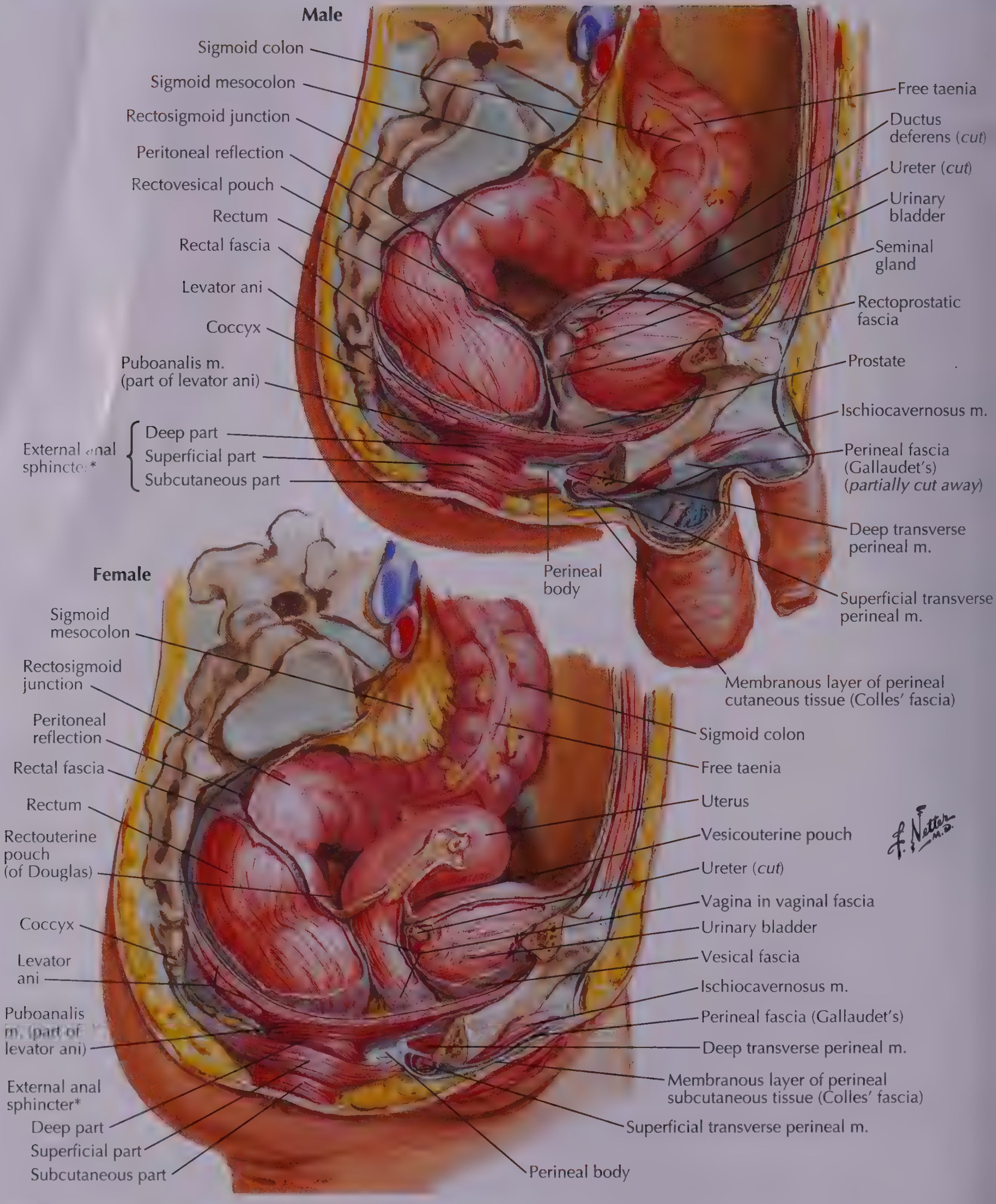
Schema


Skin of scrotum
Dartos fascia of scrotum
External spermatic fascia
Cremasteric fascia
Internal spermatic fascia
Parietal layer of tunica vaginalis testis
Visceral layer of tunica vaginalis testis
Tunica albuginea of testis
Sinus of epididymis
Epididymis
Lobules of testis
Scrotal septum (of dartos fascia)
Septa testis
Rete testis (in mediastinum testis)
Ductus deferens

Horizontal section through scrotum and testis

F. Netter M.D.

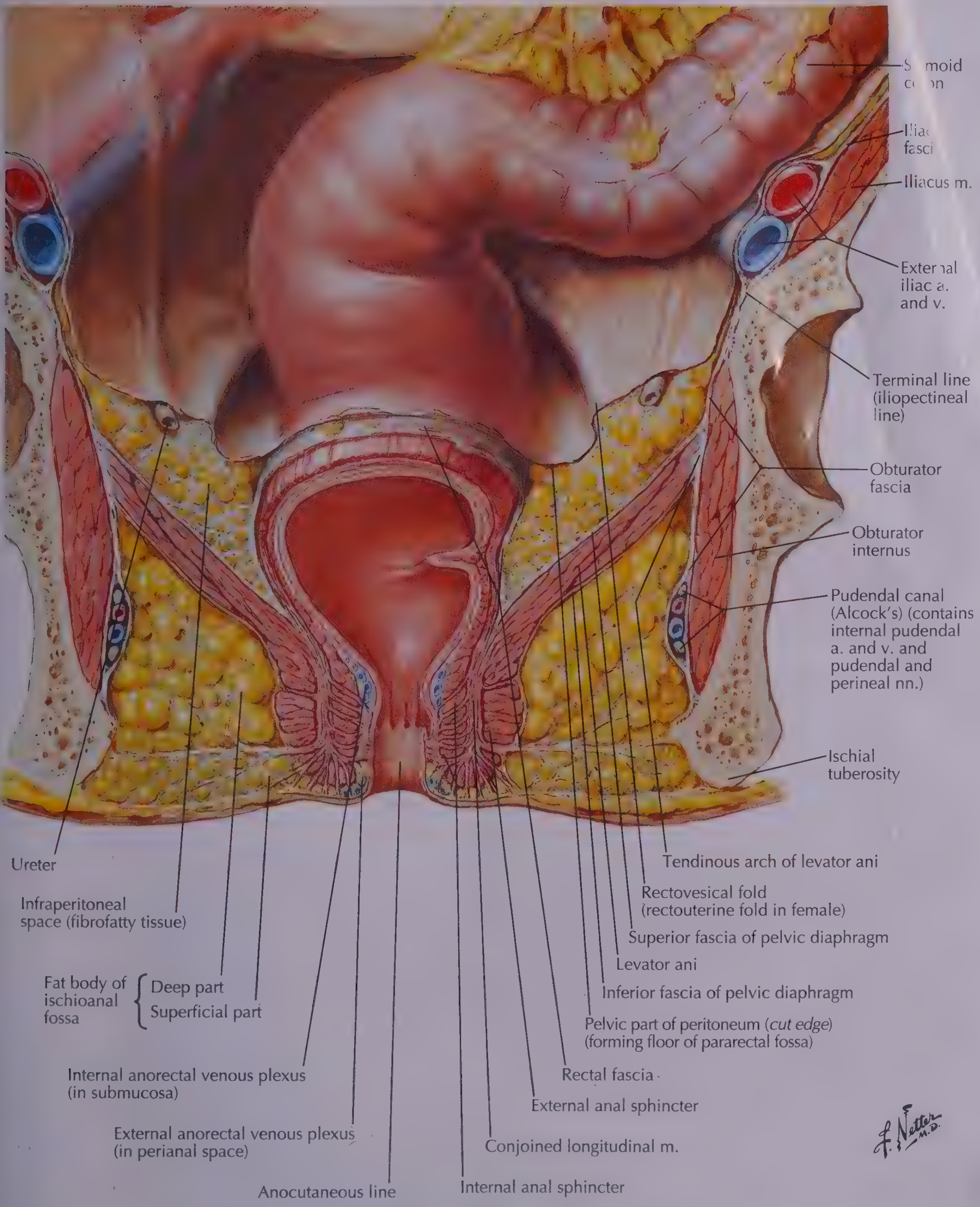
Rectum in Situ: Female and Male

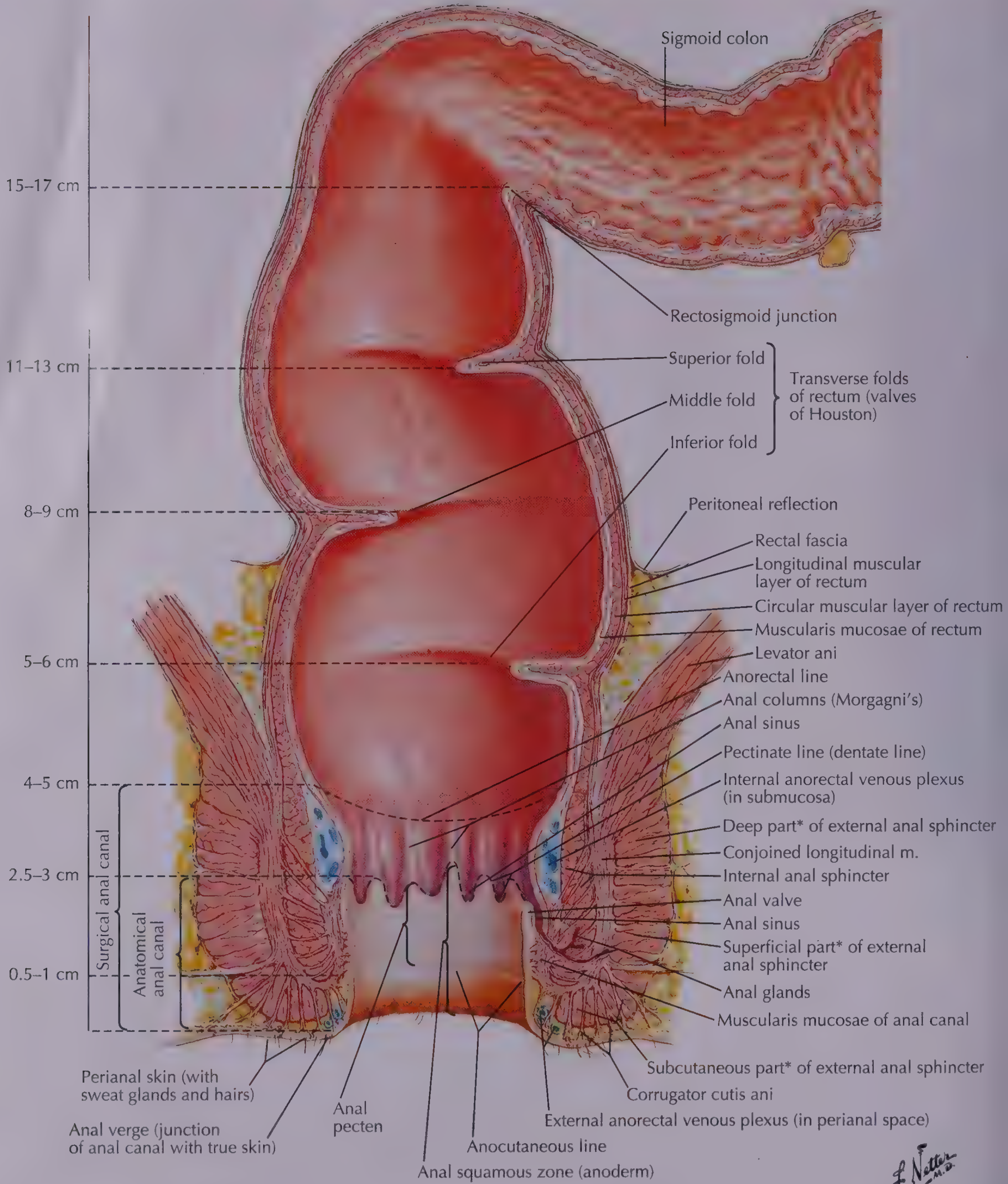

Male
Sigmoid colon
Sigmoid mesocolon
Rectosigmoid junction
Peritoneal reflection
Rectovesical pouch
Rectum
Rectal fascia
Levator ani
Coccyx
Puboanalis m. (part of levator ani)
External anal sphincter*
Deep part
Superficial part
Subcutaneous part
Free taenia
Ductus deferens (*cut*)
Ureter (*cut*)
Urinary bladder
Seminal gland
Rectoprostatic fascia
Prostate
Ischiocavernosus m.
Perineal fascia (Gallaudet's) (*partially cut away*)
Deep transverse perineal m.
Superficial transverse perineal m.
Perineal body
Membranous layer of perineal cutaneous tissue (Colles' fascia)
Female
Sigmoid mesocolon
Rectosigmoid junction
Peritoneal reflection
Rectal fascia
Rectum
Rectouterine pouch (of Douglas)
Coccyx
Levator ani
Puboanalis m. (part of levator ani)
External anal sphincter*
Deep part
Superficial part
Subcutaneous part
Sigmoid colon
Free taenia
Uterus
Vesicouterine pouch
Ureter (*cut*)
Vagina in vaginal fascia
Urinary bladder
Vesical fascia
Ischiocavernosus m.
Perineal fascia (Gallaudet's)
Deep transverse perineal m.
Membranous layer of perineal subcutaneous tissue (Colles' fascia)
Superficial transverse perineal m.
Perineal body
F. Netter M.D.

*Parts variable and often indistinct

Ischioanal Fossae

See also Plate 412

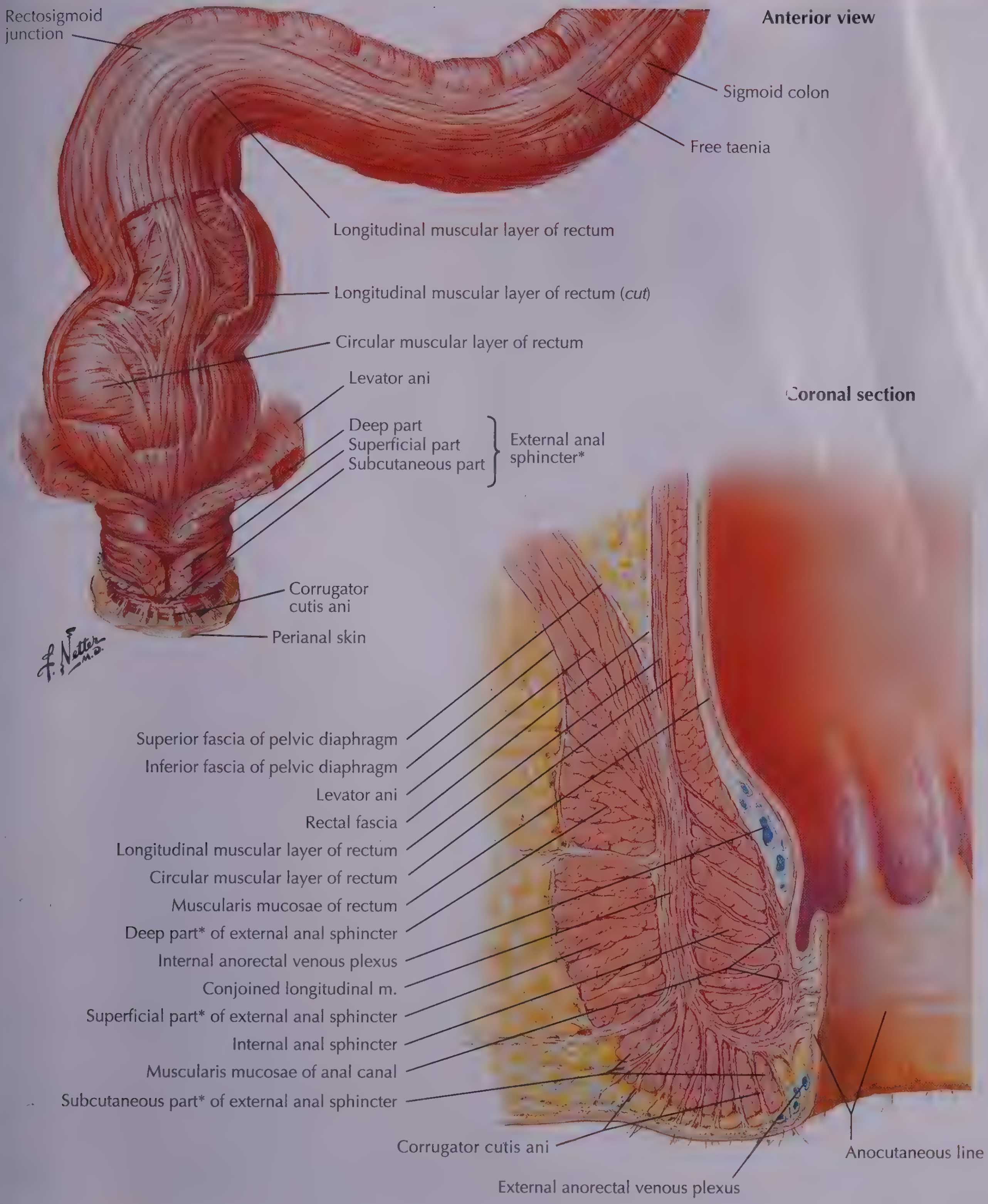

Sigmoid colon
Iliac fascia
Iliacus m.
External iliac a. and v.
Terminal line (iliopectineal line)
Obturator fascia
Obturator internus
Pudendal canal (Alcock's) (contains internal pudendal a. and v. and pudendal and perineal nn.)
Ischial tuberosity
Tendinous arch of levator ani
Rectovesical fold (rectouterine fold in female)
Superior fascia of pelvic diaphragm
Levator ani
Inferior fascia of pelvic diaphragm
Pelvic part of peritoneum (*cut edge*) (forming floor of pararectal fossa)
Rectal fascia
External anal sphincter
Conjoined longitudinal m.
Internal anal sphincter
Ureter
Infraperitoneal space (fibrofatty tissue)
Fat body of ischioanal fossa
Deep part
Superficial part
Internal anorectal venous plexus (in submucosa)
External anorectal venous plexus (in perianal space)
Anocutaneous line


Sigmoid colon
Rectosigmoid junction
Superior fold
Middle fold
Inferior fold
Transverse folds of rectum (valves of Houston)
Peritoneal reflection
Rectal fascia
Longitudinal muscular layer of rectum
Circular muscular layer of rectum
Muscularis mucosae of rectum
Levator ani
Anorectal line
Anal columns (Morgagni's)
Anal sinus
Pectinate line (dentate line)
Internal anorectal venous plexus (in submucosa)
Deep part* of external anal sphincter
Conjoined longitudinal m.
Internal anal sphincter
Anal valve
Anal sinus
Superficial part* of external anal sphincter
Anal glands
Muscularis mucosae of anal canal
Subcutaneous part* of external anal sphincter
Corrugator cutis ani
External anorectal venous plexus (in perianal space)
Anocutaneous line
Anal squamous zone (anoderm)
Anal pecten
Anal verge (junction of anal canal with true skin)
Perianal skin (with sweat glands and hairs)
15–17 cm
11–13 cm
8–9 cm
5–6 cm
4–5 cm
2.5–3 cm
0.5–1 cm
Surgical anal canal
Anatomical anal canal

*Parts variable and often indistinct

Anorectal Musculature

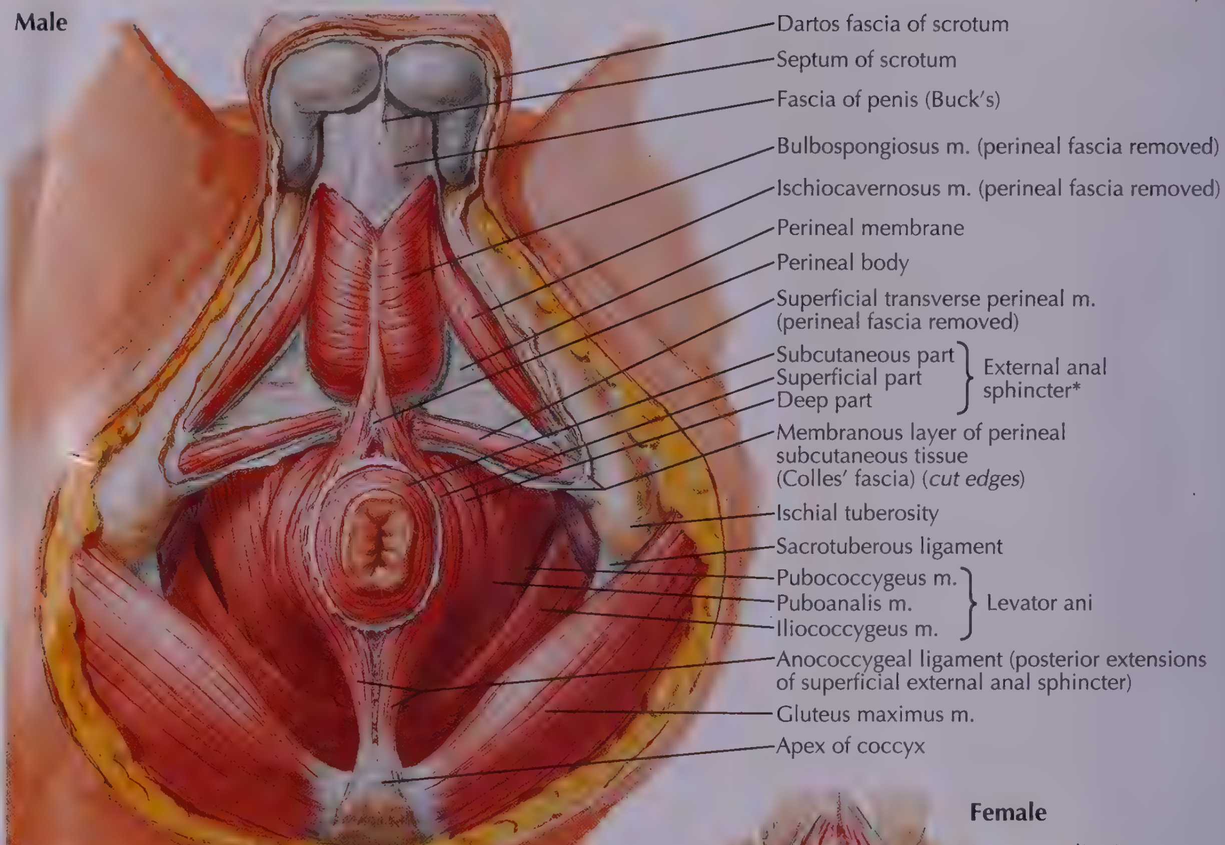
See also Plates 400, 401

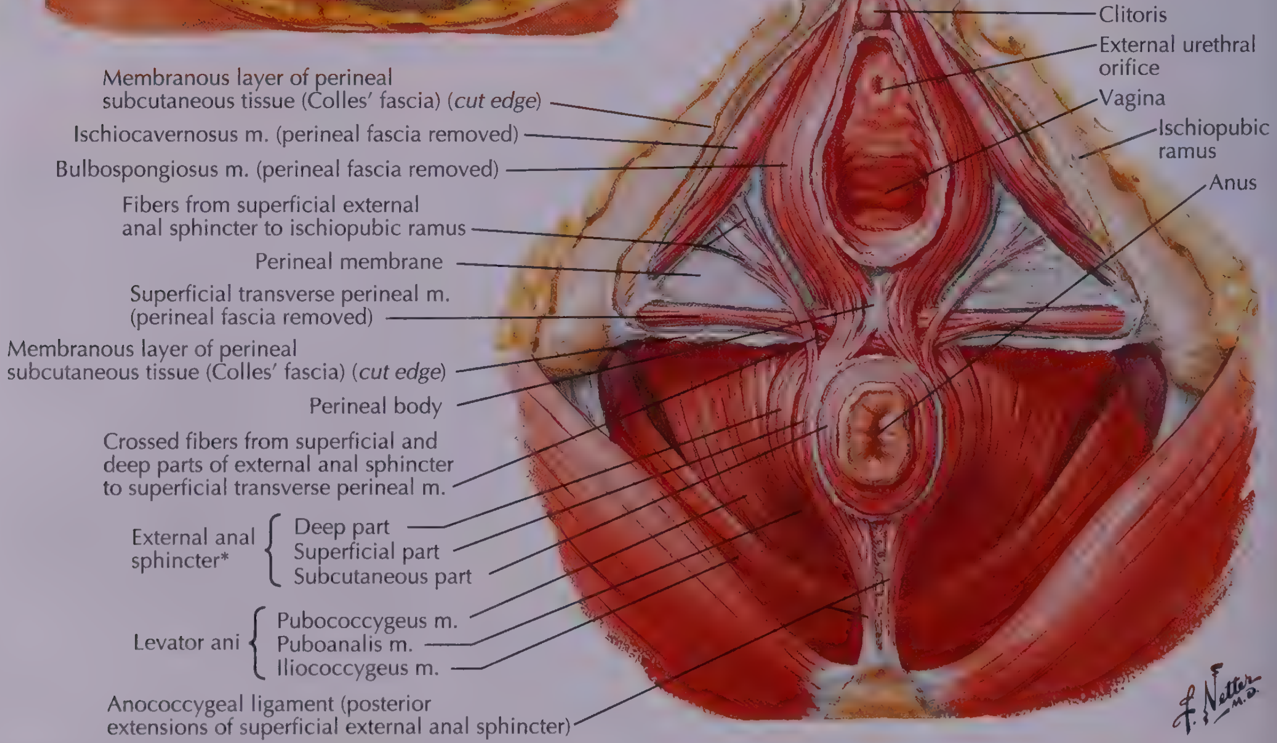

Anterior view
Rectosigmoid junction
Sigmoid colon
Free taenia
Longitudinal muscular layer of rectum
Longitudinal muscular layer of rectum (*cut*)
Circular muscular layer of rectum
Levator ani
Deep part
Superficial part
Subcutaneous part
External anal sphincter*
Corrugator cutis ani
Perianal skin
F. Netter M.D.
Coronal section
Superior fascia of pelvic diaphragm
Inferior fascia of pelvic diaphragm
Levator ani
Rectal fascia
Longitudinal muscular layer of rectum
Circular muscular layer of rectum
Muscularis mucosae of rectum
Deep part* of external anal sphincter
Internal anorectal venous plexus
Conjoined longitudinal m.
Superficial part* of external anal sphincter
Internal anal sphincter
Muscularis mucosae of anal canal
Subcutaneous part* of external anal sphincter
Corrugator cutis ani
External anorectal venous plexus
Anocutaneous line

*Parts variable and often indistinct

External Anal Sphincter: Perineal Views

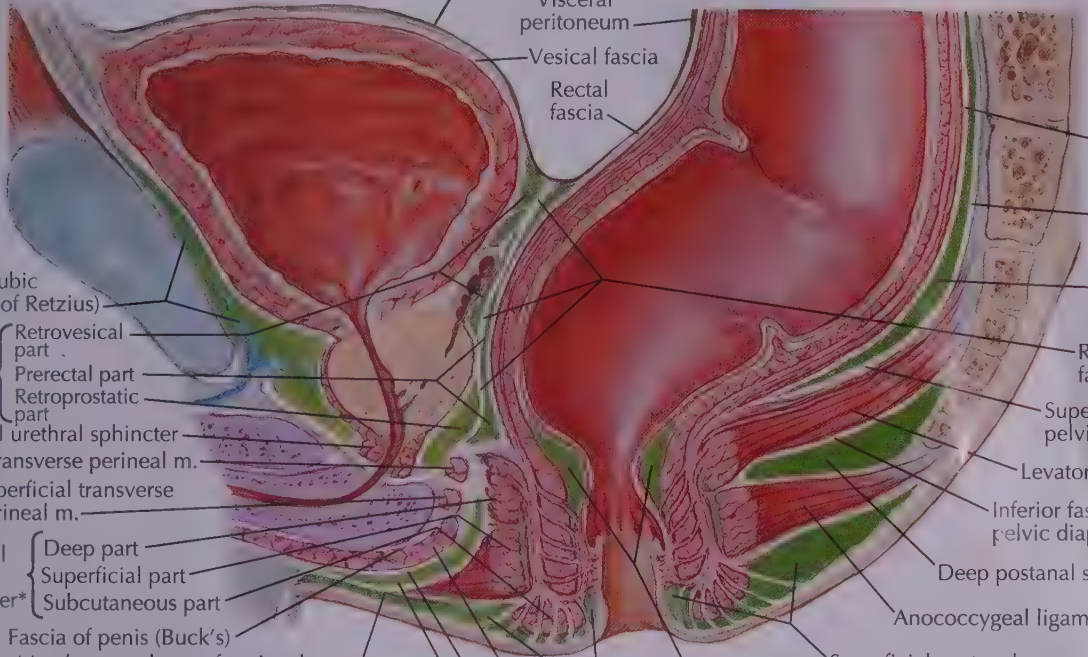
See also Plates 379, 384


Male
Dartos fascia of scrotum
Septum of scrotum
Fascia of penis (Buck's)
Bulbospongiosus m. (perineal fascia removed)
Ischiocavernosus m. (perineal fascia removed)
Perineal membrane
Perineal body
Superficial transverse perineal m. (perineal fascia removed)
Subcutaneous part
Superficial part
Deep part
External anal sphincter*
Membranous layer of perineal subcutaneous tissue (Colles' fascia) (cut edges)
Ischial tuberosity
Sacrotuberous ligament
Pubococcygeus m.
Puboanalis m.
Iliococcygeus m.
Levator ani
Anococcygeal ligament (posterior extensions of superficial external anal sphincter)
Gluteus maximus m.
Apex of coccyx

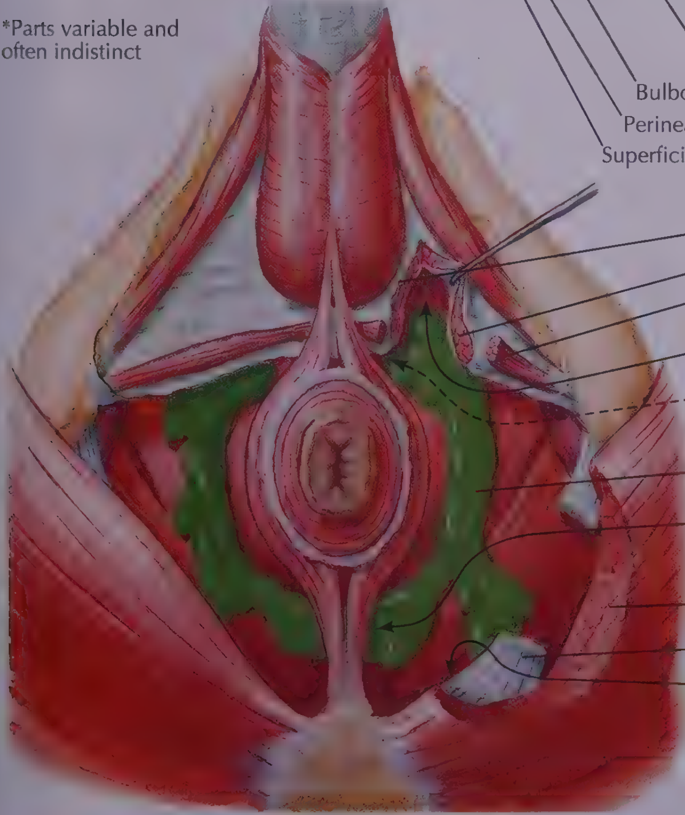

Female
Clitoris
External urethral orifice
Vagina
Ischiopubic ramus
Anus
Membranous layer of perineal subcutaneous tissue (Colles' fascia) (cut edge)
Ischiocavernosus m. (perineal fascia removed)
Bulbospongiosus m. (perineal fascia removed)
Fibers from superficial external anal sphincter to ischiopubic ramus
Perineal membrane
Superficial transverse perineal m. (perineal fascia removed)
Membranous layer of perineal subcutaneous tissue (Colles' fascia) (cut edge)
Perineal body
Crossed fibers from superficial and deep parts of external anal sphincter to superficial transverse perineal m.
External anal sphincter*
Deep part
Superficial part
Subcutaneous part
Levator ani
Pubococcygeus m.
Puboanalis m.
Iliococcygeus m.
Anococcygeal ligament (posterior extensions of superficial external anal sphincter)
F. Netter M.D.

*Parts variable and often indistinct

Female: Sagittal section


Pelvic part of peritoneum
Visceral peritoneum
Vesical fascia
Rectal fascia
Rectal fascia
Presacral fascia
Presacral space
Rectoprostatic fascia
Superior fascia of pelvic diaphragm
Levator ani
Inferior fascia of pelvic diaphragm
Deep postanal space
Anococcygeal ligament
Superficial postanal space (part of perianal space)
Submucous space
Perianal space
Bulbospongiosus m.
Perineal fascia (Gallaudet's)
Superficial perineal space
Retropubic space (of Retzius)
Recto-vesical space
Retrovesical part
Prerectal part
Retroprostatic part
External urethral sphincter
Deep transverse perineal m.
Superficial transverse perineal m.
External anal sphincter*
Deep part
Superficial part
Subcutaneous part
Fascia of penis (Buck's)
Membranous layer of perineal subcutaneous tissue (Colles' fascia)

*Parts variable and often indistinct

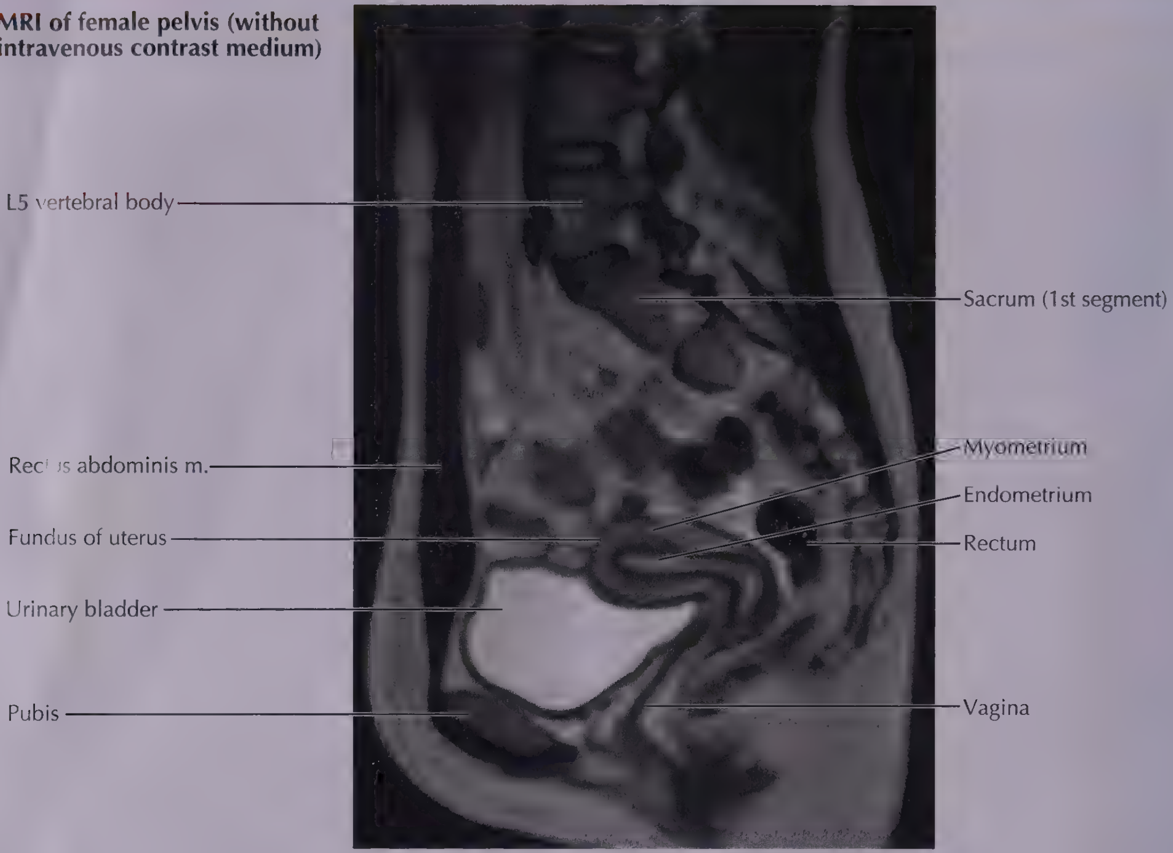

Perineal membrane
Deep transverse perineal m.
Superficial transverse perineal m. (*cut away*)
Anterior recess of ischioanal fossa
Anterior communication (inconstant) between right and left ischioanal fossae (via a preanal space)
Purulence in ischioanal fossa
Posterior communication between right and left ischioanal fossae (via deep postanal space deep to anococcygeal ligament)
Gluteus maximus m. (*cut*)
Sacrotuberous ligament (*cut*)
Posterior recess of ischioanal fossa
F. Netter M.D.
C. Machado M.D.

Male: Perineal view

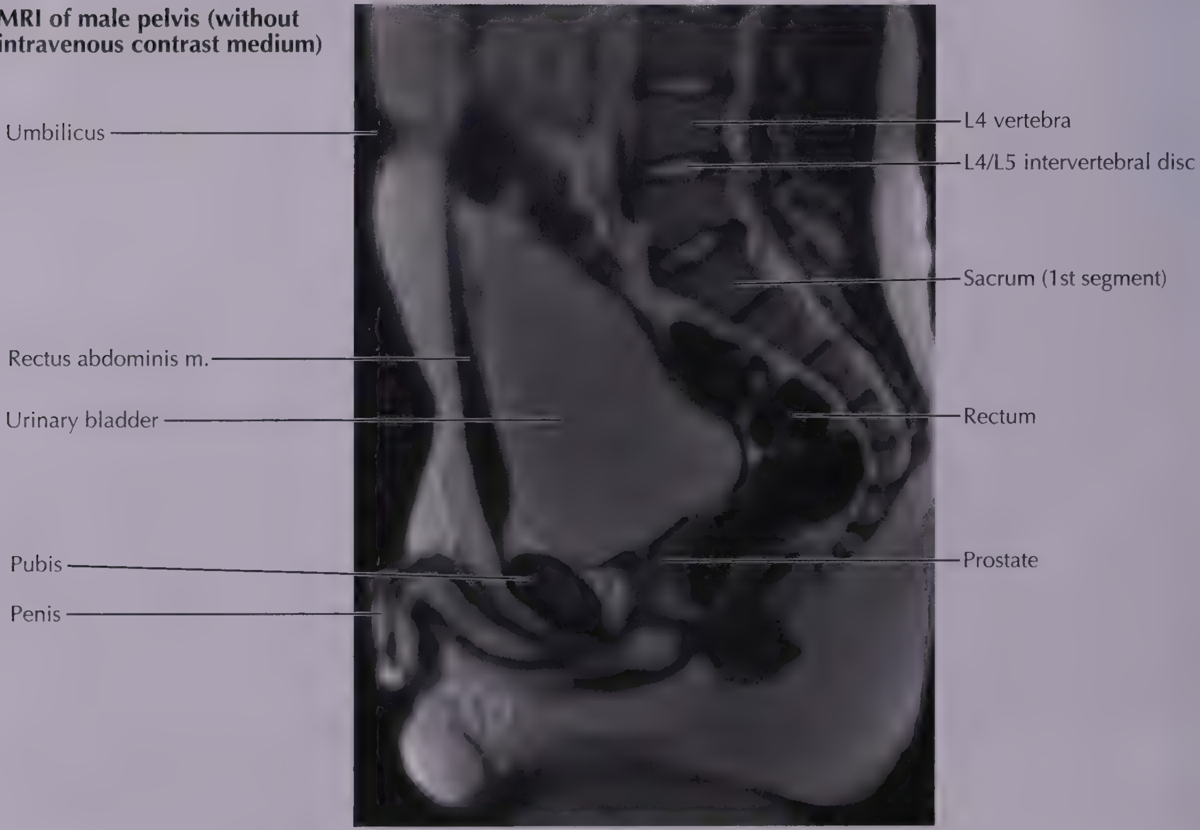
Spread of perineal abscess in perineal spaces

Pelvic Scans: Sagittal T2-Weighted MRIs

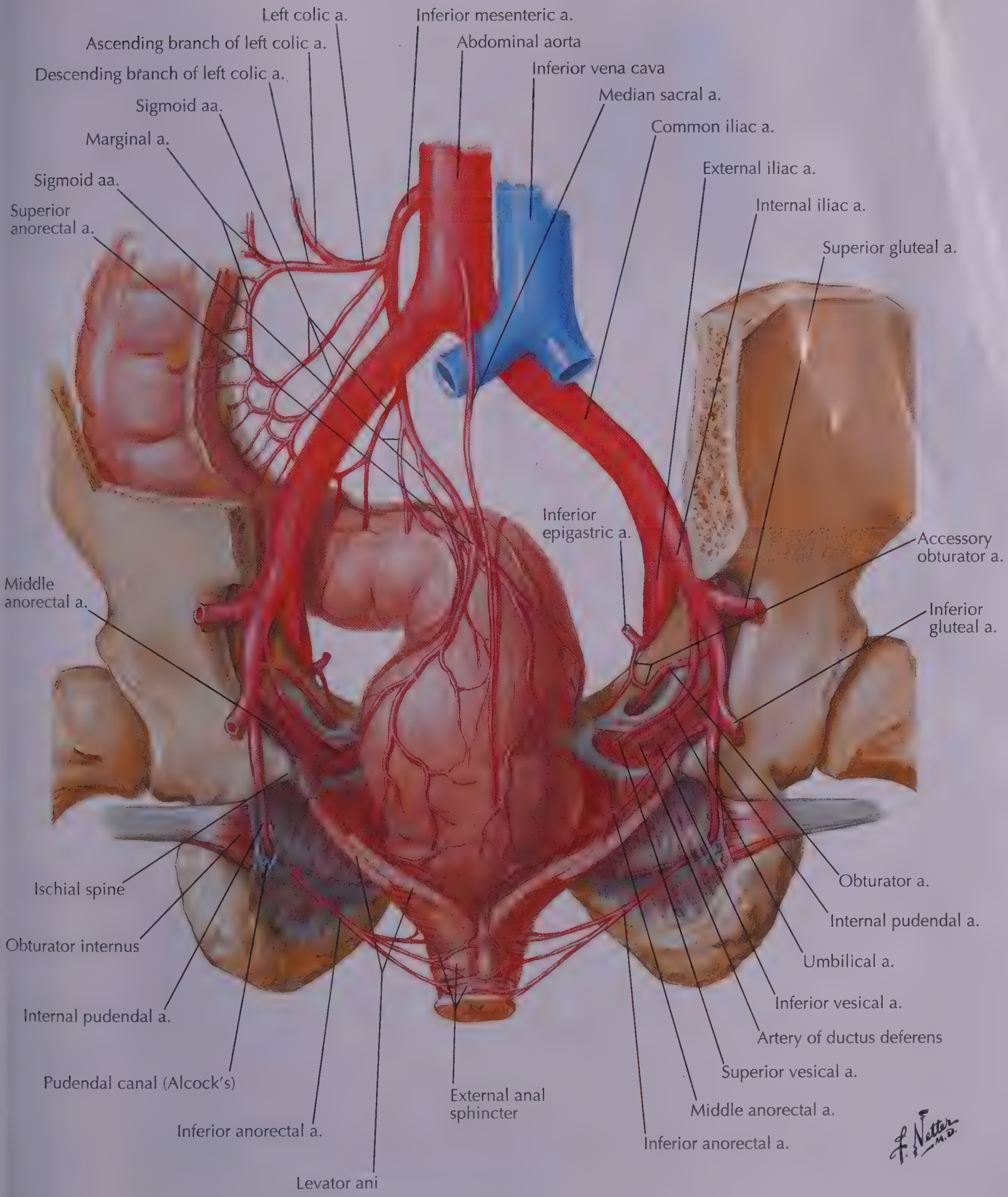
MRI of female pelvis (without intravenous contrast medium)

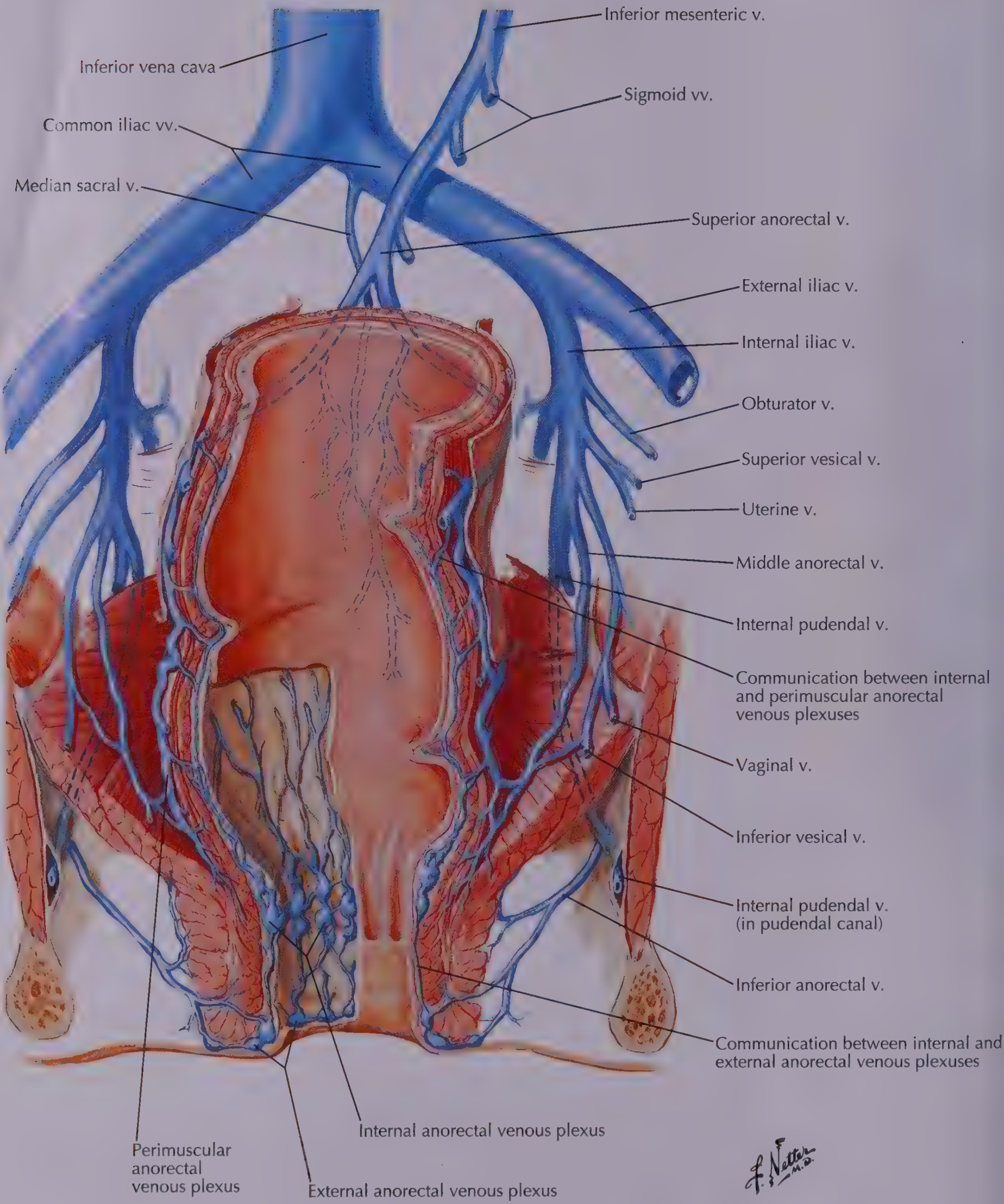

L5 vertebral body
Sacrum (1st segment)
Rectus abdominis m.
Myometrium
Endometrium
Fundus of uterus
Rectum
Urinary bladder
Pubis
Vagina

MRI of male pelvis (without intravenous contrast medium)

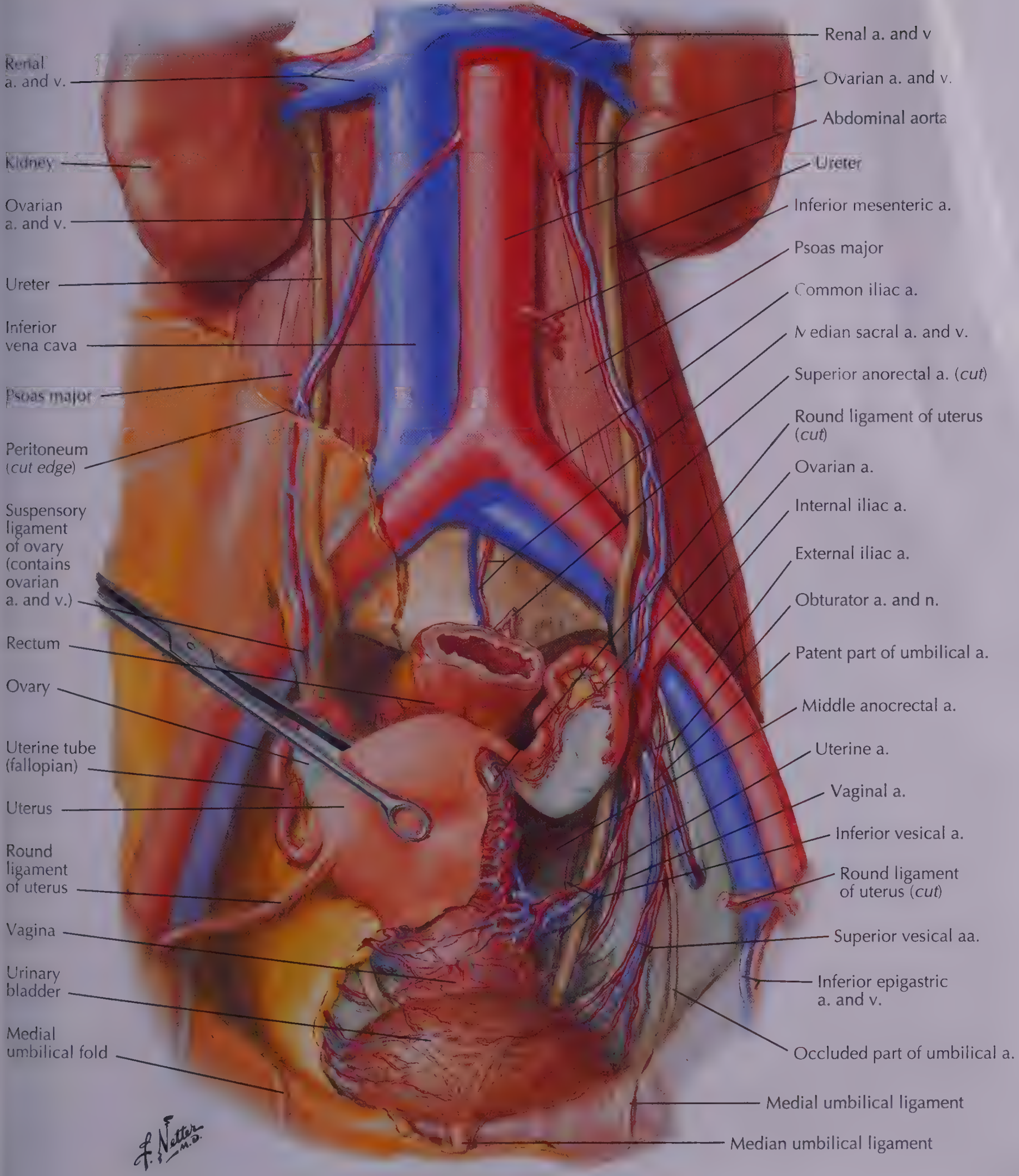

Umbilicus
L4 vertebra
L4/L5 intervertebral disc
Sacrum (1st segment)
Rectus abdominis m.
Urinary bladder
Rectum
Prostate
Pubis
Penis

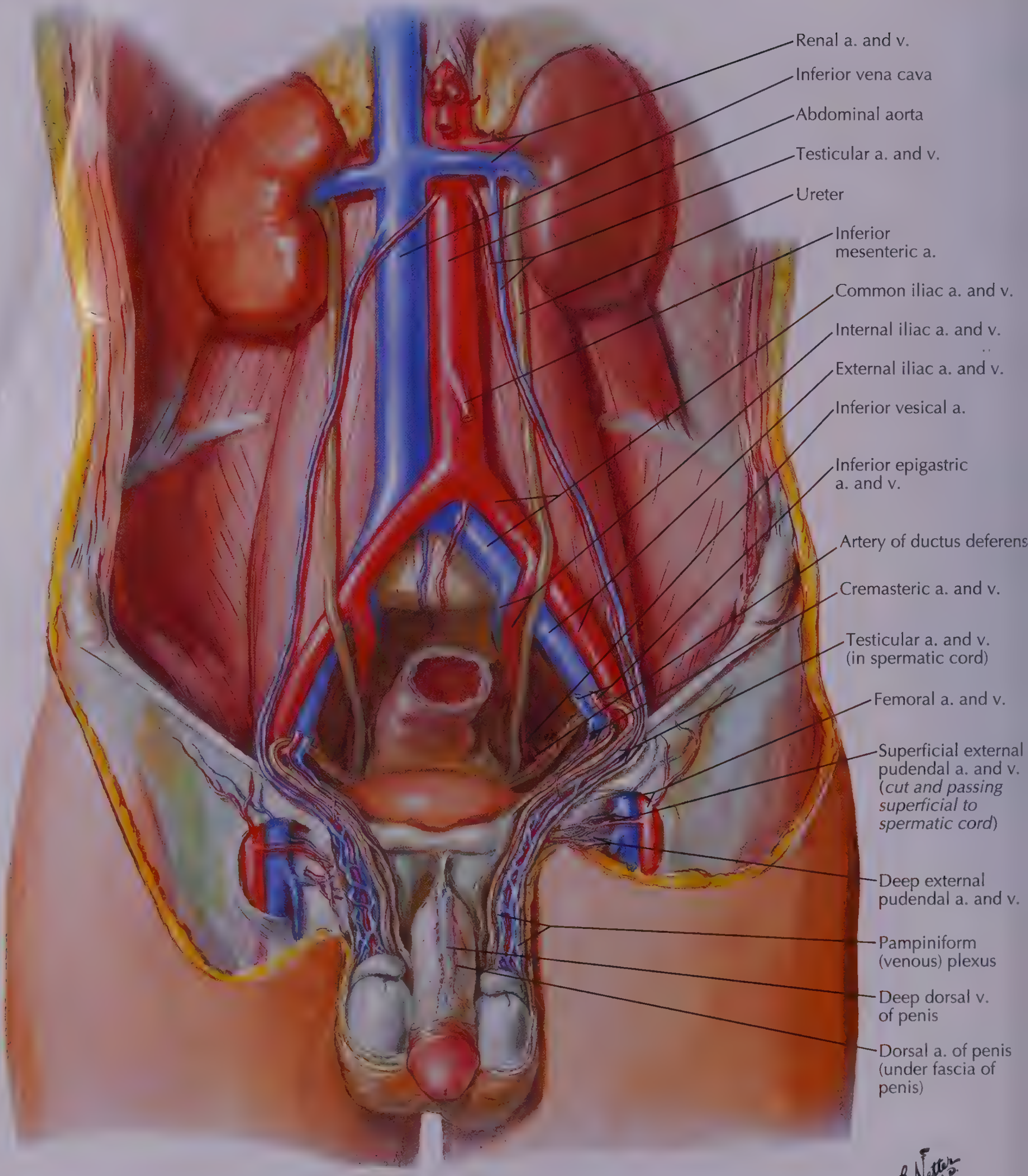
Arteries of Rectum and Anal Canal: Male Posterior View


Left colic a.
Inferior mesenteric a.
Ascending branch of left colic a.
Abdominal aorta
Descending branch of left colic a.
Inferior vena cava
Median sacral a.
Sigmoid aa.
Common iliac a.
Marginal a.
External iliac a.
Sigmoid aa.
Internal iliac a.
Superior anorectal a.
Superior gluteal a.
Inferior epigastric a.
Accessory obturator a.
Middle anorectal a.
Inferior gluteal a.
Ischial spine
Obturator a.
Obturator internus
Internal pudendal a.
Umbilical a.
Internal pudendal a.
Inferior vesical a.
Artery of ductus deferens
Pudendal canal (Alcock's)
Superior vesical a.
External anal sphincter
Middle anorectal a.
Inferior anorectal a.
Inferior anorectal a.
Levator ani
F. Netter M.D.


Inferior mesenteric v.
Inferior vena cava
Sigmoid vv.
Common iliac vv.
Median sacral v.
Superior anorectal v.
External iliac v.
Internal iliac v.
Obturator v.
Superior vesical v.
Uterine v.
Middle anorectal v.
Internal pudendal v.
Communication between internal and perimuscular anorectal venous plexuses
Vaginal v.
Inferior vesical v.
Internal pudendal v. (in pudendal canal)
Inferior anorectal v.
Communication between internal and external anorectal venous plexuses
Internal anorectal venous plexus
Perimuscular anorectal venous plexus
External anorectal venous plexus
F. Netter M.D.

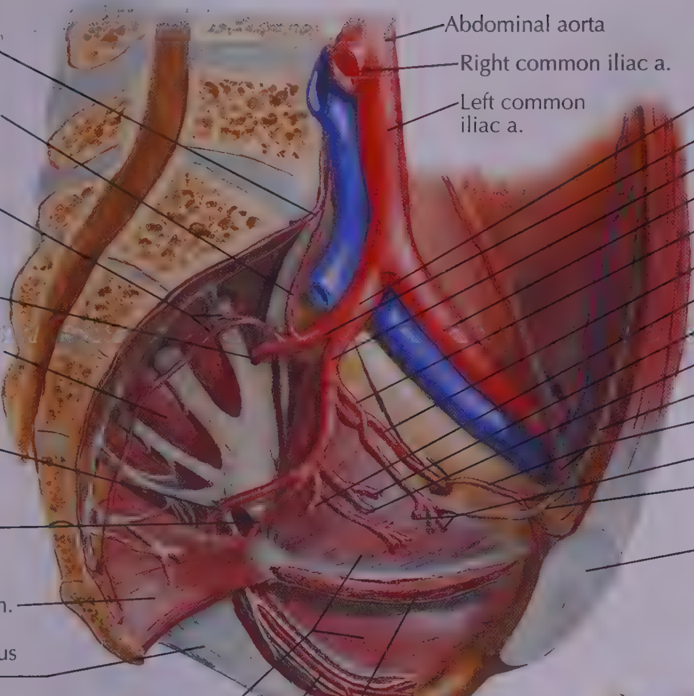
Arteries and Veins of Pelvic Viscera: Female Anterior View


Renal a. and v.
Kidney
Ovarian a. and v.
Ureter
Inferior vena cava
Psoas major
Peritoneum (*cut edge*)
Suspensory ligament of ovary (contains ovarian a. and v.)
Rectum
Ovary
Uterine tube (fallopian)
Uterus
Round ligament of uterus
Vagina
Urinary bladder
Medial umbilical fold
Renal a. and v
Ovarian a. and v.
Abdominal aorta
Ureter
Inferior mesenteric a.
Psoas major
Common iliac a.
Median sacral a. and v.
Superior anorectal a. (*cut*)
Round ligament of uterus (*cut*)
Ovarian a.
Internal iliac a.
External iliac a.
Obturator a. and n.
Patent part of umbilical a.
Middle anocrectal a.
Uterine a.
Vaginal a.
Inferior vesical a.
Round ligament of uterus (*cut*)
Superior vesical aa.
Inferior epigastric a. and v.
Occluded part of umbilical a.
Medial umbilical ligament
Median umbilical ligament

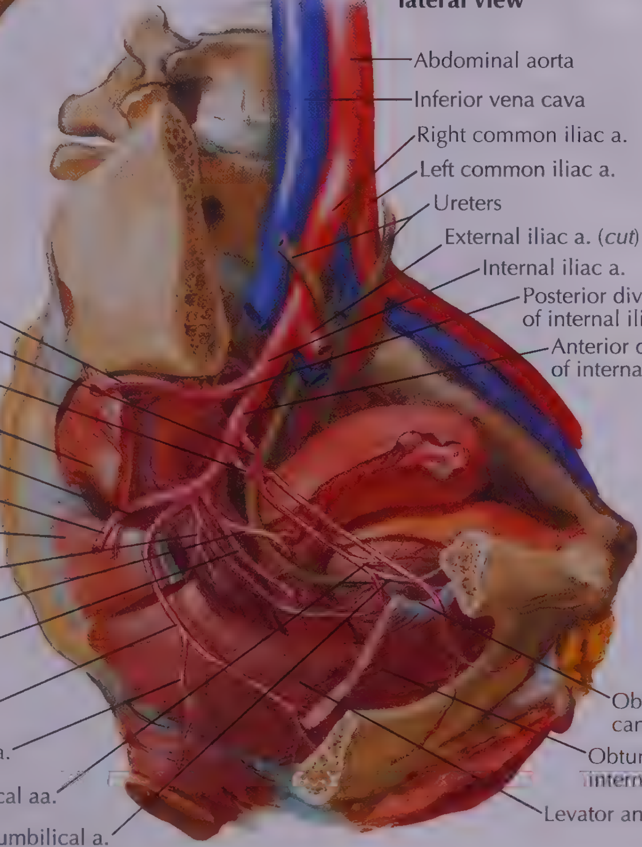

Renal a. and v.
Inferior vena cava
Abdominal aorta
Testicular a. and v.
Ureter
Inferior mesenteric a.
Common iliac a. and v.
Internal iliac a. and v.
External iliac a. and v.
Inferior vesical a.
Inferior epigastric a. and v.
Artery of ductus deferens
Cremasteric a. and v.
Testicular a. and v. (in spermatic cord)
Femoral a. and v.
Superficial external pudendal a. and v. (*cut and passing superficial to spermatic cord*)
Deep external pudendal a. and v.
Pampiniform (venous) plexus
Deep dorsal v. of penis
Dorsal a. of penis (under fascia of penis)

F. Netter M.D.

Sagittal section


Median sacral a.
Iliolumbar a.
Lateral sacral aa.
Superior gluteal a.
Piriformis m.
Inferior gluteal a.
Internal pudendal a.
Coccygeus m.
Sacrotuberous ligament
Obturator fascia (of obturator internus)
Internal pudendal a. (in pudendal canal)
Levator ani (*cut edge*)
Abdominal aorta
Right common iliac a.
Left common iliac a.
Internal iliac a.
Posterior division of internal iliac a.
Anterior division of internal iliac a.
External iliac a.
Patent part of umbilical a.
Obturator a.
Middle anorectal a.
Uterine a.
Vaginal a.
Medial umbilical ligament
Accessory obturator a.
Superior vesical aa.
Occluded part of umbilical a.
Pubic symphysis

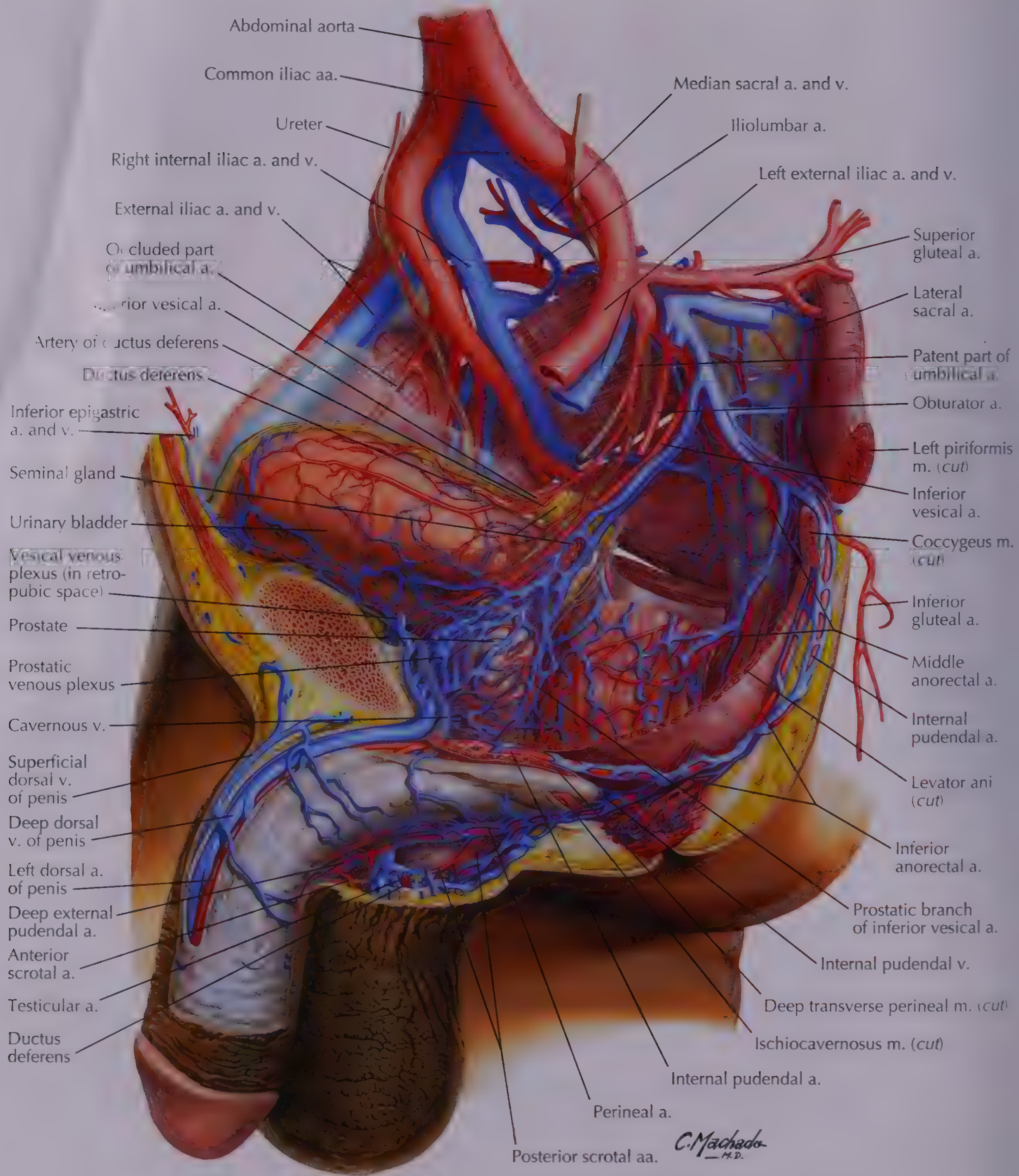
Right paramedian section: lateral view


Abdominal aorta
Inferior vena cava
Right common iliac a.
Left common iliac a.
Ureters
External iliac a. (*cut*)
Internal iliac a.
Posterior division of internal iliac a.
Anterior division of internal iliac a.
Superior gluteal a.
Patent part of umbilical a.
Obturator a.
Piriformis m.
Internal pudendal a.
Inferior gluteal a.
Coccygeus m.
Middle anorectal a.
Uterine a.
Vaginal a.
Internal pudendal a.
Inferior anorectal a.
Superior vesical aa.
Occluded part of umbilical a.
Obturator canal
Obturator internus
Levator ani

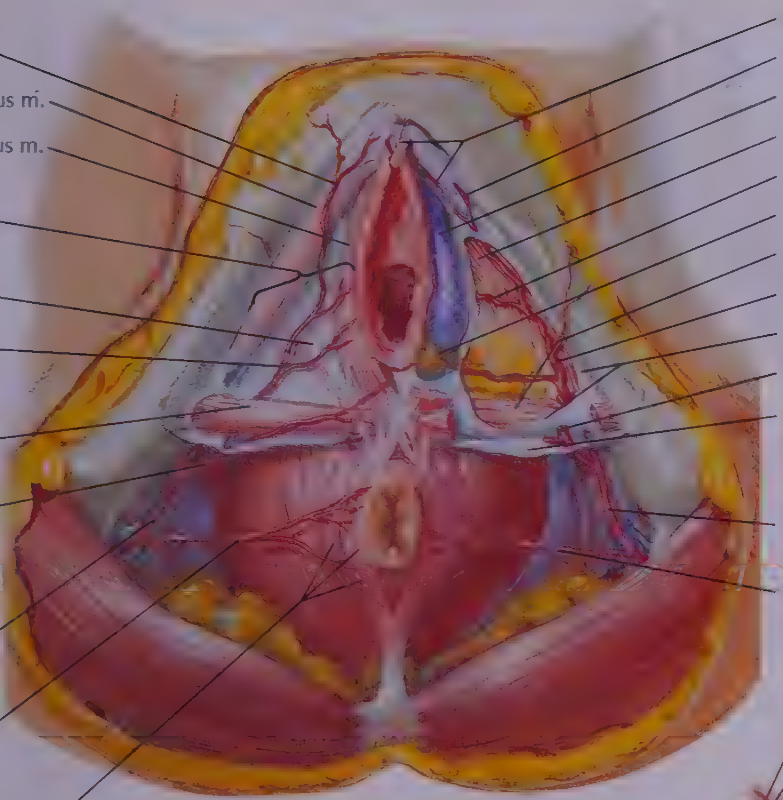
F. Netter M.D.

Arteries and Veins of Pelvis: Male

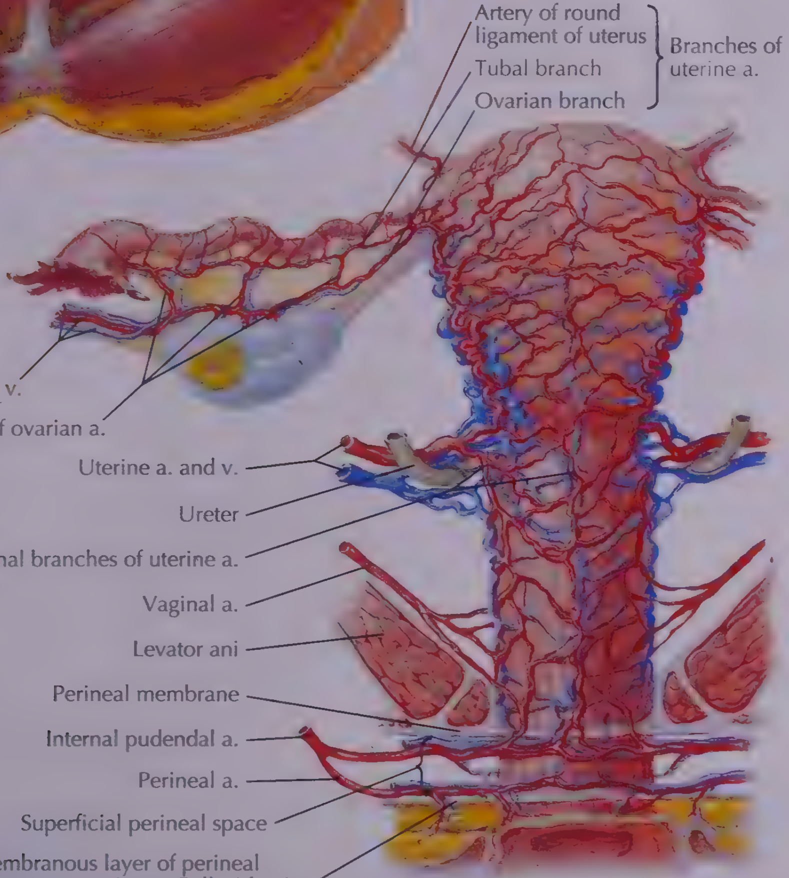
See also Plates 93, BP 93



Abdominal aorta
Common iliac aa.
Ureter
Right internal iliac a. and v.
External iliac a. and v.
Occluded part of umbilical a.
Superior vesical a.
Artery of ductus deferens
Ductus deferens
Inferior epigastric a. and v.
Seminal gland
Urinary bladder
Vesical venous plexus (in retropubic space)
Prostate
Prostatic venous plexus
Cavernous v.
Superficial dorsal v. of penis
Deep dorsal v. of penis
Left dorsal a. of penis
Deep external pudendal a.
Anterior scrotal a.
Testicular a.
Ductus deferens
Median sacral a. and v.
Iliolumbar a.
Left external iliac a. and v.
Superior gluteal a.
Lateral sacral a.
Patent part of umbilical a.
Obturator a.
Left piriformis m. (cut)
Inferior vesical a.
Coccygeus m. (cut)
Inferior gluteal a.
Middle anorectal a.
Internal pudendal a.
Levator ani (cut)
Inferior anorectal a.
Prostatic branch of inferior vesical a.
Internal pudendal v.
Deep transverse perineal m. (cut)
Ischiocavernosus m. (cut)
Internal pudendal a.
Perineal a.
Posterior scrotal aa.
C. Machado M.D.

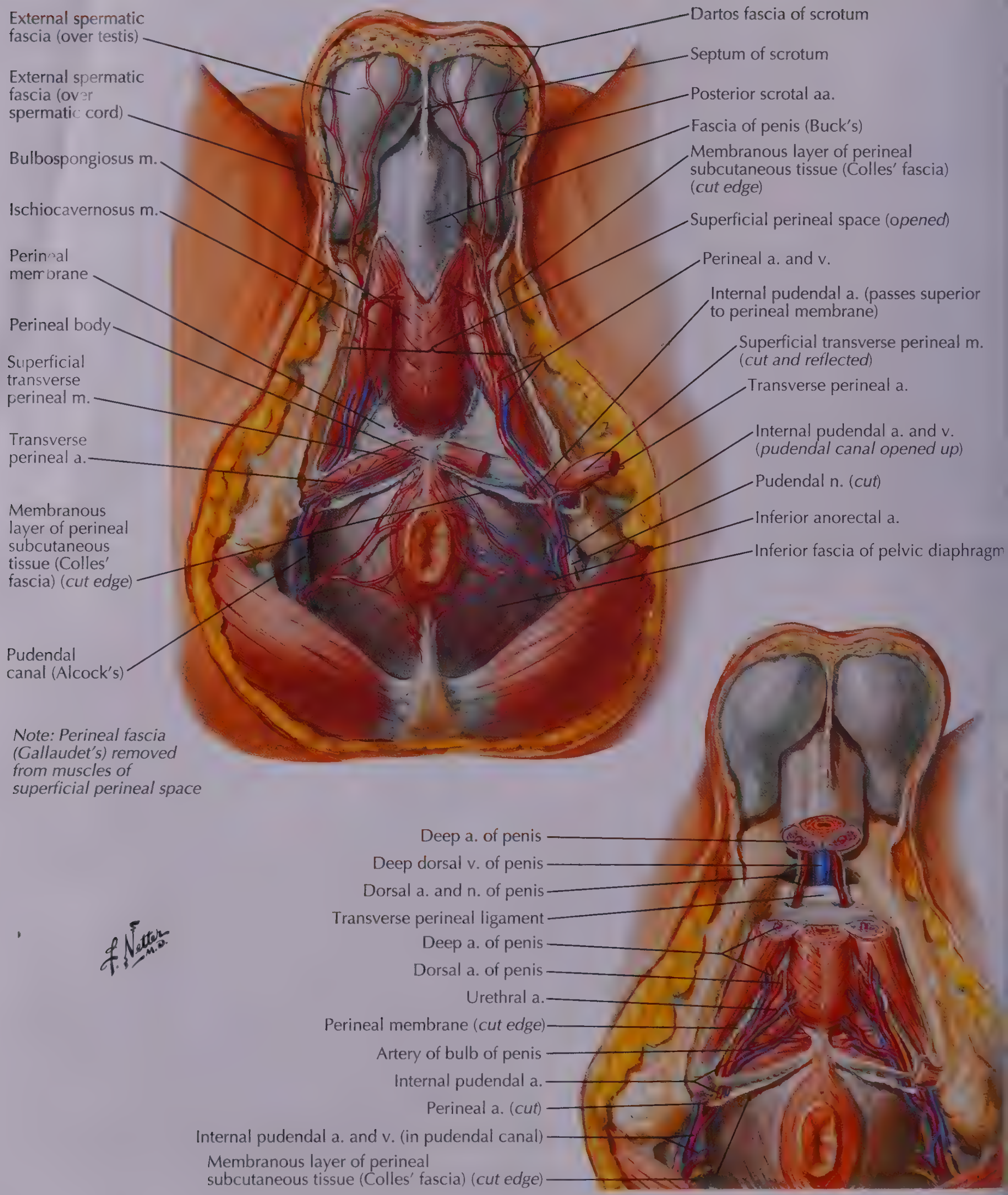

Posterior labial a.
Ischiocavernosus m.
Bulbospongiosus m.
Superficial perineal space
Perineal membrane
Perineal a.
Superficial transverse perineal m.
Perineal a.
Internal pudendal a. (in pudendal canal)
Inferior anorectal a.
External anal sphincter
Dorsal a. of clitoris
Deep a. of clitoris
Bulb of vestibule
Compressor urethrae
Artery to bulb of vestibule
Greater vestibular gland (Bartholin's)
Deep transverse perineal m.
Internal pudendal a.
Perineal membrane (cut away)
Perineal a. (cut)
Membranous layer of perineal subcutaneous tissue (Colles' fascia) (cut and reflected to open superficial perineal space)
Internal pudendal a. (in pudendal canal)
Inferior anorectal a.

Note: Perineal fascia (Gallaudet's) removed from muscles of superficial perineal space


Artery of round ligament of uterus
Tubal branch
Ovarian branch
Branches of uterine a.
Ovarian a. and v.
Tubal branches of ovarian a.
Uterine a. and v.
Ureter
Vaginal branches of uterine a.
Vaginal a.
Levator ani
Perineal membrane
Internal pudendal a.
Perineal a.
Superficial perineal space
Membranous layer of perineal subcutaneous tissue (Colles' fascia)

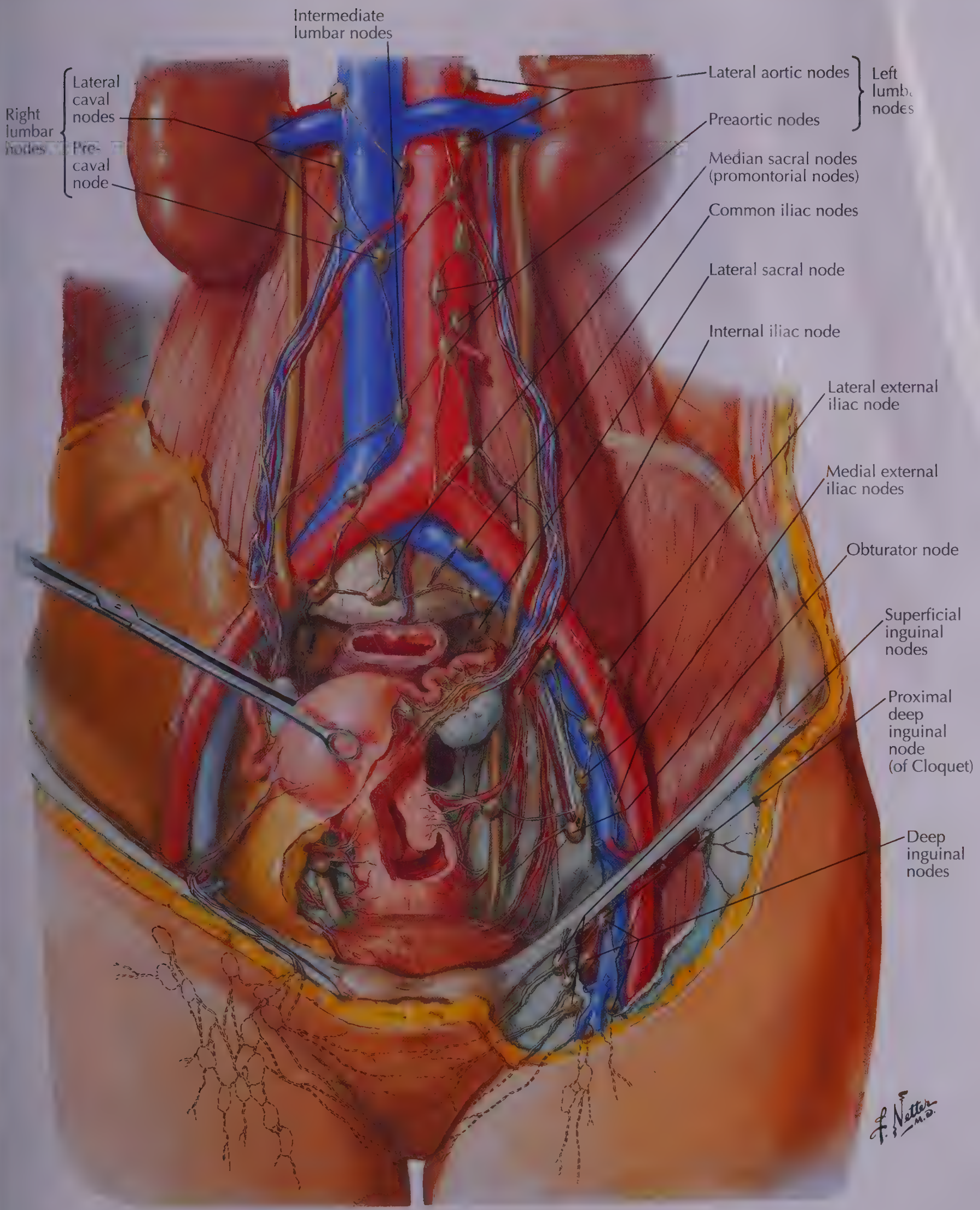
F. Netter M.D.
C. Machado M.D.

Arteries and Veins of Perineum: Male

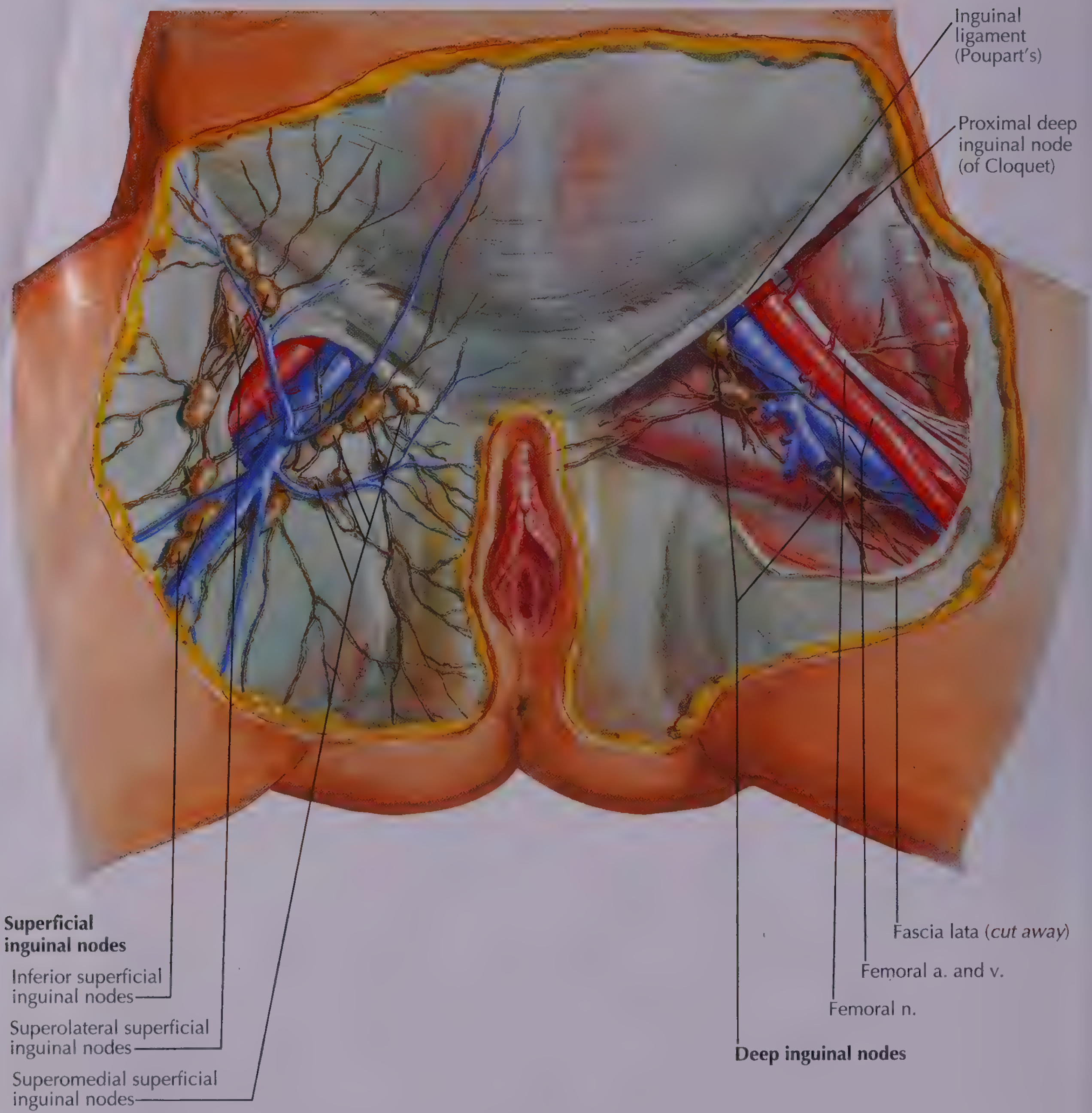

External spermatic fascia (over testis)
External spermatic fascia (over spermatic cord)
Bulbospongiosus m.
Ischiocavernosus m.
Perineal membrane
Perineal body
Superficial transverse perineal m.
Transverse perineal a.
Membranous layer of perineal subcutaneous tissue (Colles' fascia) (*cut edge*)
Pudendal canal (Alcock's)
Dartos fascia of scrotum
Septum of scrotum
Posterior scrotal aa.
Fascia of penis (Buck's)
Membranous layer of perineal subcutaneous tissue (Colles' fascia) (*cut edge*)
Superficial perineal space (*opened*)
Perineal a. and v.
Internal pudendal a. (passes superior to perineal membrane)
Superficial transverse perineal m. (*cut and reflected*)
Transverse perineal a.
Internal pudendal a. and v. (*pudendal canal opened up*)
Pudendal n. (*cut*)
Inferior anorectal a.
Inferior fascia of pelvic diaphragm
Deep a. of penis
Deep dorsal v. of penis
Dorsal a. and n. of penis
Transverse perineal ligament
Deep a. of penis
Dorsal a. of penis
Urethral a.
Perineal membrane (*cut edge*)
Artery of bulb of penis
Internal pudendal a.
Perineal a. (*cut*)
Internal pudendal a. and v. (in pudendal canal)
Membranous layer of perineal subcutaneous tissue (Colles' fascia) (*cut edge*)

Note: Perineal fascia (Gallaudet's) removed from muscles of superficial perineal space

Lymph Vessels and Lymph Nodes of Pelvis and Genitalia: Female

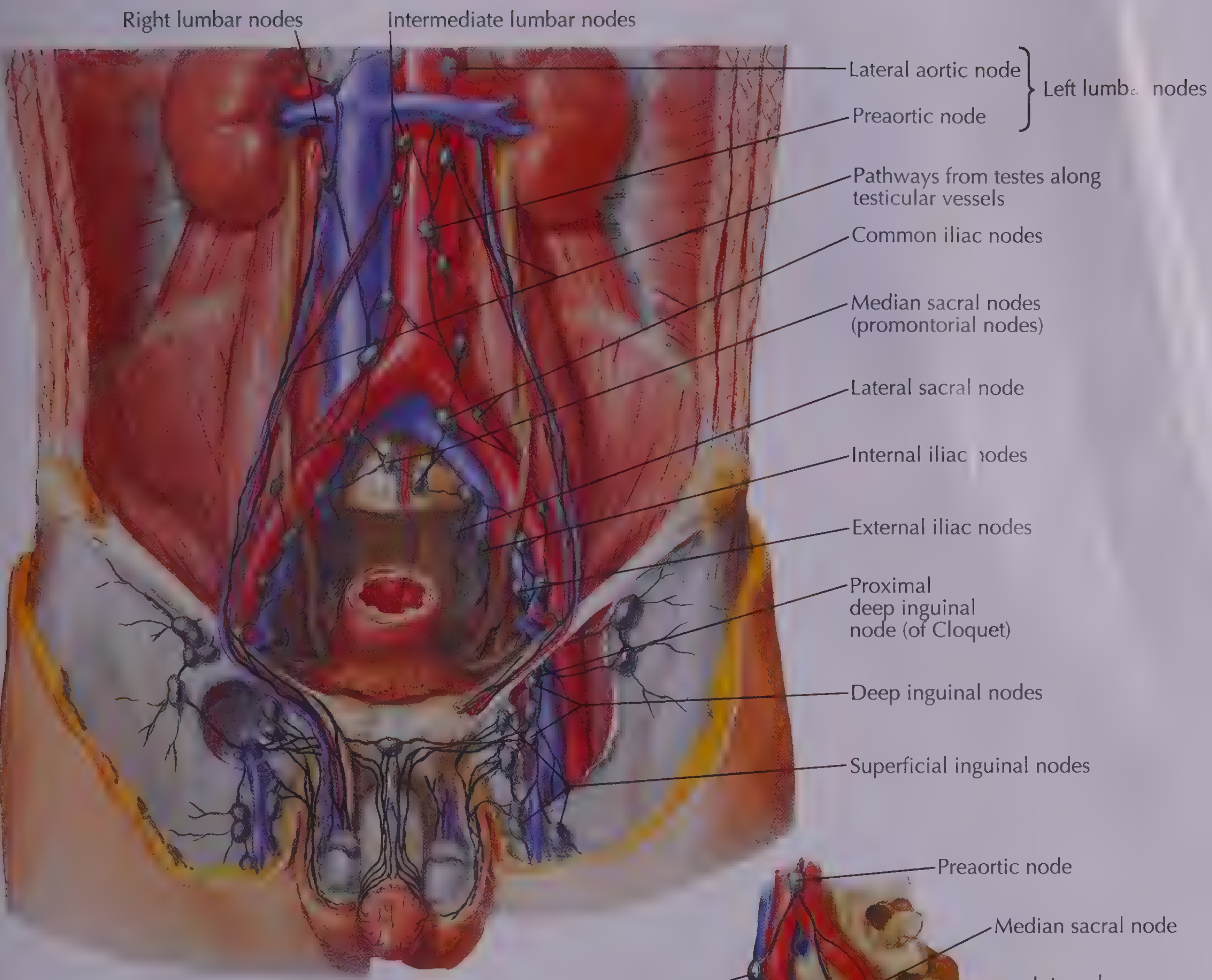

Intermediate lumbar nodes
Lateral caval nodes
Right lumbar nodes
Pre-caval node
Lateral aortic nodes
Preaortic nodes
Left lumb nodes
Median sacral nodes (promontorial nodes)
Common iliac nodes
Lateral sacral node
Internal iliac node
Lateral external iliac node
Medial external iliac nodes
Obturator node
Superficial inguinal nodes
Proximal deep inguinal node (of Cloquet)
Deep inguinal nodes
F. Netter M.D.

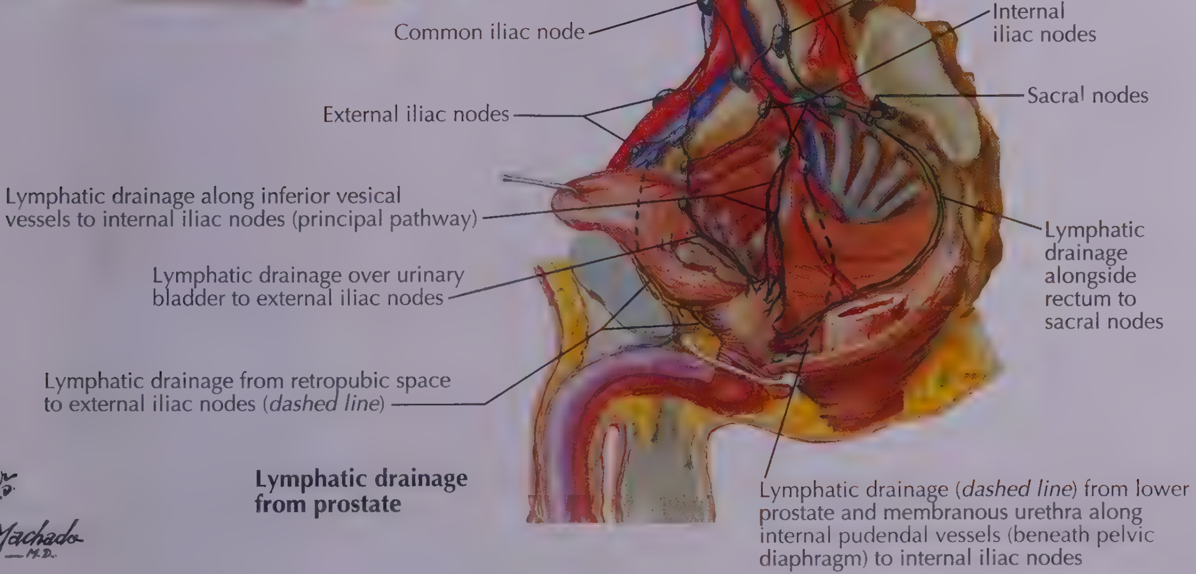
Inguinal Nodes and Lymph Vessels of Perineum: Female


Inguinal ligament (Poupart's)
Proximal deep inguinal node (of Cloquet)
Superficial inguinal nodes
Inferior superficial inguinal nodes
Superolateral superficial inguinal nodes
Superomedial superficial inguinal nodes
Fascia lata (*cut away*)
Femoral a. and v.
Femoral n.
Deep inguinal nodes

F. Netter M.D.

Lymph Vessels and Lymph Nodes of Pelvis and Genitalia: Male


Right lumbar nodes
Intermediate lumbar nodes
Lateral aortic node
Preaortic node
Left lumbar nodes
Pathways from testes along testicular vessels
Common iliac nodes
Median sacral nodes (promontorial nodes)
Lateral sacral node
Internal iliac nodes
External iliac nodes
Proximal deep inguinal node (of Cloquet)
Deep inguinal nodes
Superficial inguinal nodes

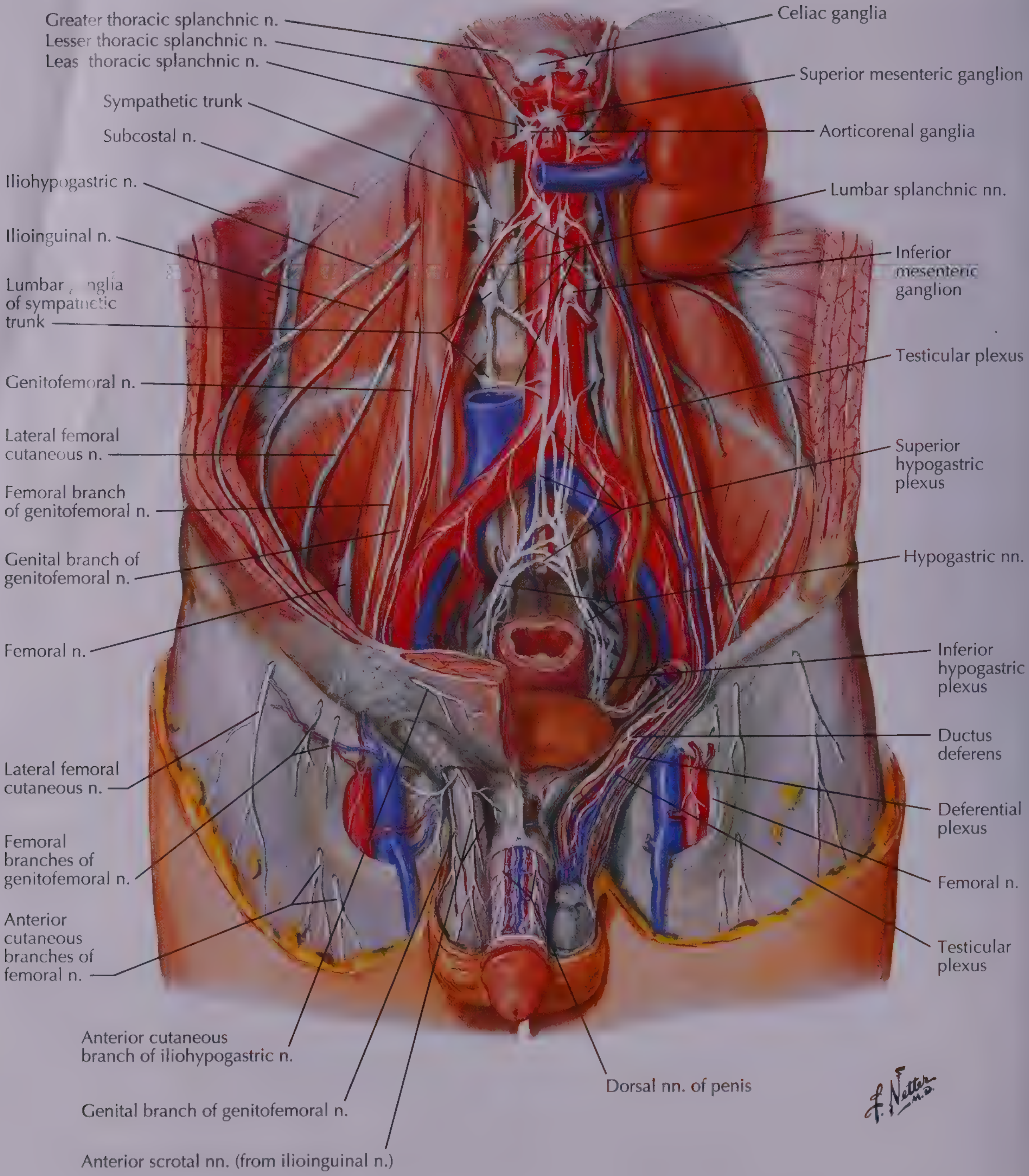

Preaortic node
Median sacral node
Common iliac node
Internal iliac nodes
Sacral nodes
External iliac nodes
Lymphatic drainage along inferior vesical vessels to internal iliac nodes (principal pathway)
Lymphatic drainage over urinary bladder to external iliac nodes
Lymphatic drainage alongside rectum to sacral nodes
Lymphatic drainage from retropubic space to external iliac nodes (*dashed line*)
Lymphatic drainage (*dashed line*) from lower prostate and membranous urethra along internal pudendal vessels (beneath pelvic diaphragm) to internal iliac nodes

Lymphatic drainage from prostate

F. Netter M.D.
C. Machado M.D.

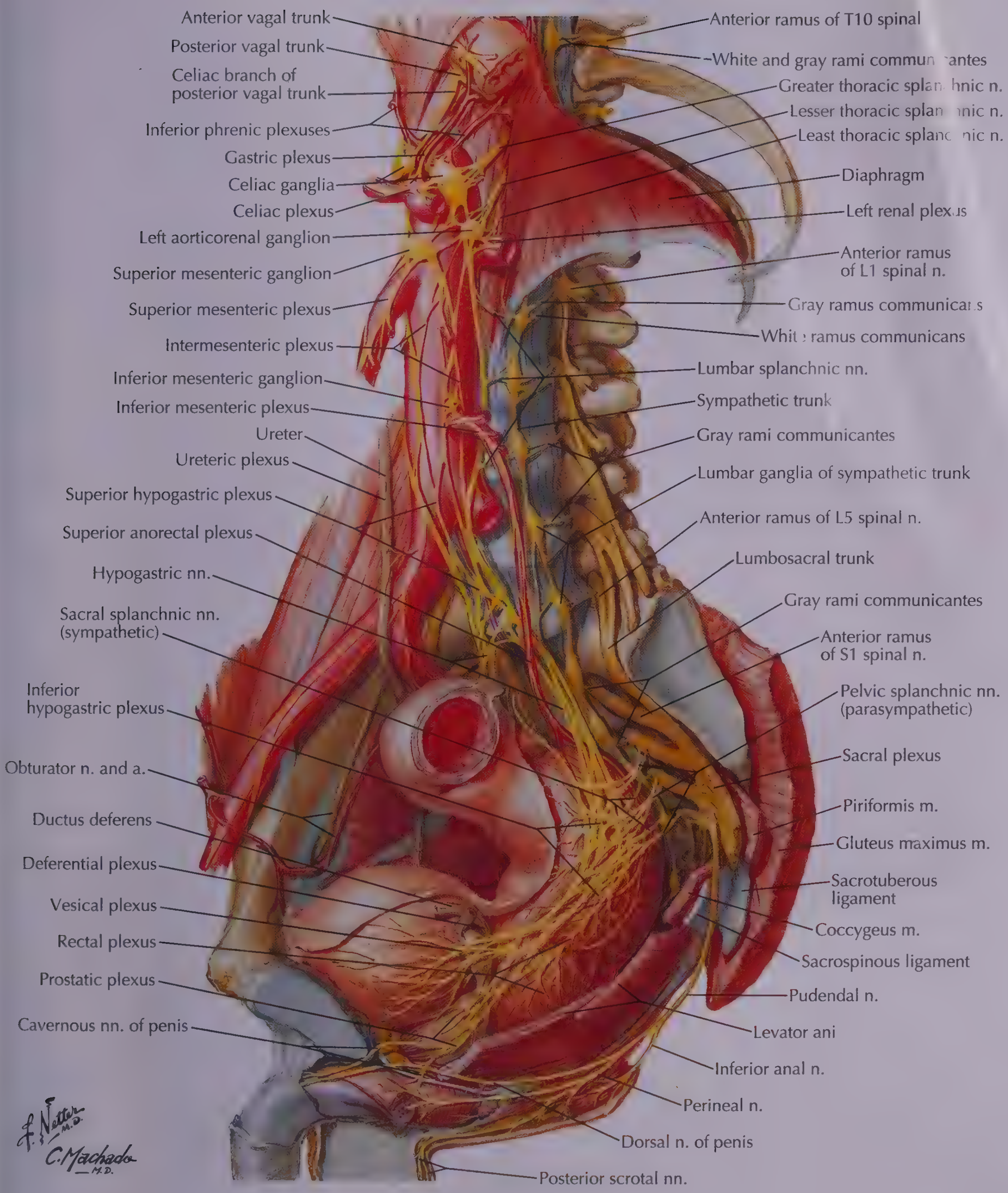
Nerves of External Genitalia: Male

See also Plate 319


Greater thoracic splanchnic n.
Lesser thoracic splanchnic n.
Least thoracic splanchnic n.
Sympathetic trunk
Subcostal n.
Iliohypogastric n.
Ilioinguinal n.
Lumbar ganglia of sympathetic trunk
Genitofemoral n.
Lateral femoral cutaneous n.
Femoral branch of genitofemoral n.
Genital branch of genitofemoral n.
Femoral n.
Lateral femoral cutaneous n.
Femoral branches of genitofemoral n.
Anterior cutaneous branches of femoral n.
Anterior cutaneous branch of iliohypogastric n.
Genital branch of genitofemoral n.
Anterior scrotal nn. (from ilioinguinal n.)
Celiac ganglia
Superior mesenteric ganglion
Aorticorenal ganglia
Lumbar splanchnic nn.
Inferior mesenteric ganglion
Testicular plexus
Superior hypogastric plexus
Hypogastric nn.
Inferior hypogastric plexus
Ductus deferens
Deferential plexus
Femoral n.
Testicular plexus
Dorsal nn. of penis
F. Netter M.D.

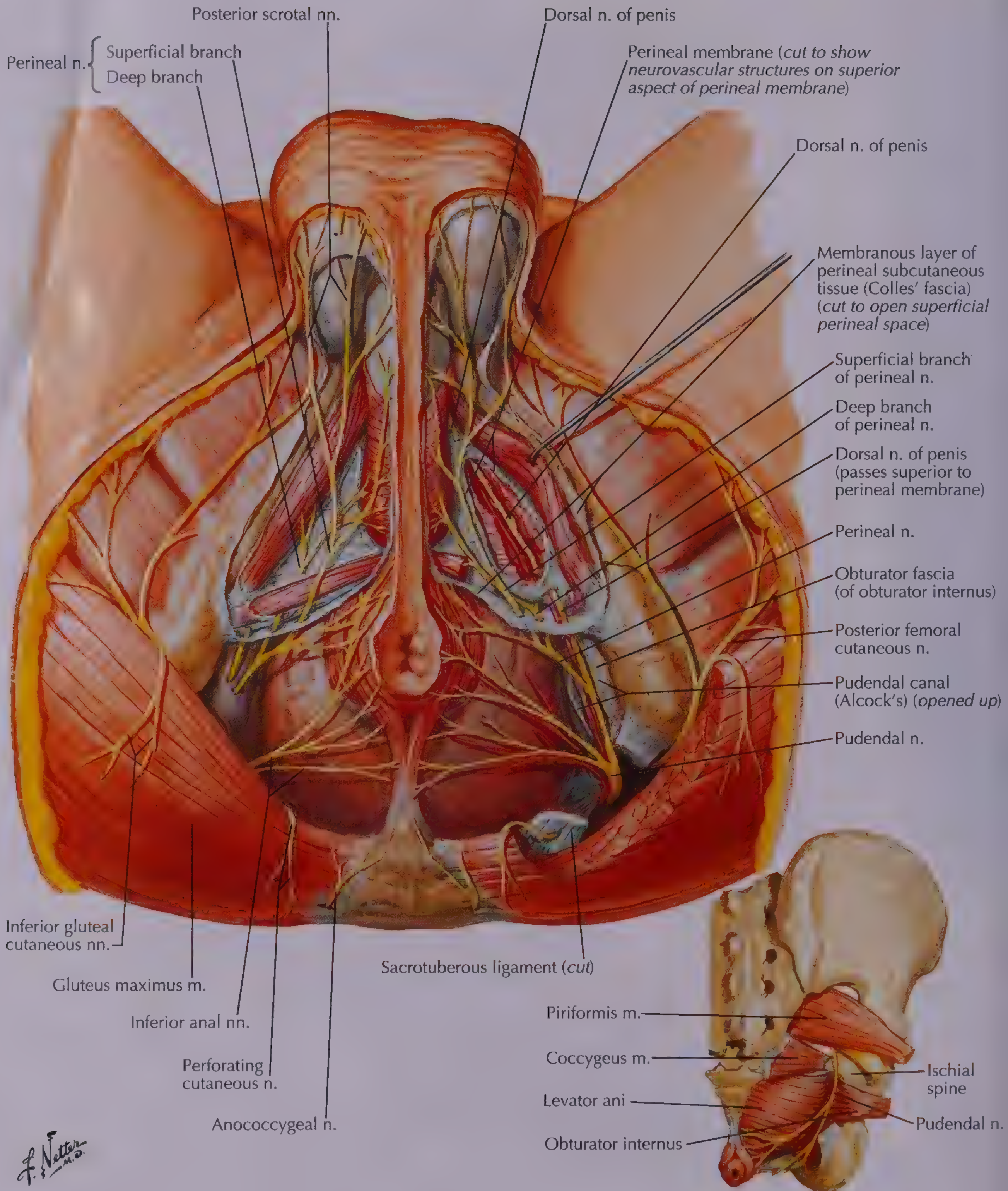
Nerves of Pelvic Viscera: Male

See also Plates 319, 399


Anterior vagal trunk
Posterior vagal trunk
Celiac branch of posterior vagal trunk
Inferior phrenic plexuses
Gastric plexus
Celiac ganglia
Celiac plexus
Left aorticorenal ganglion
Superior mesenteric ganglion
Superior mesenteric plexus
Intermesenteric plexus
Inferior mesenteric ganglion
Inferior mesenteric plexus
Ureter
Ureteric plexus
Superior hypogastric plexus
Superior anorectal plexus
Hypogastric nn.
Sacral splanchnic nn. (sympathetic)
Inferior hypogastric plexus
Obturator n. and a.
Ductus deferens
Deferential plexus
Vesical plexus
Rectal plexus
Prostatic plexus
Cavernous nn. of penis
Anterior ramus of T10 spinal
White and gray rami communicantes
Greater thoracic splanchnic n.
Lesser thoracic splanchnic n.
Least thoracic splanchnic n.
Diaphragm
Left renal plexus
Anterior ramus of L1 spinal n.
Gray ramus communicans
White ramus communicans
Lumbar splanchnic nn.
Sympathetic trunk
Gray rami communicantes
Lumbar ganglia of sympathetic trunk
Anterior ramus of L5 spinal n.
Lumbosacral trunk
Gray rami communicantes
Anterior ramus of S1 spinal n.
Pelvic splanchnic nn. (parasympathetic)
Sacral plexus
Piriformis m.
Gluteus maximus m.
Sacrotuberous ligament
Coccygeus m.
Sacrospinous ligament
Pudendal n.
Levator ani
Inferior anal n.
Perineal n.
Dorsal n. of penis
Posterior scrotal nn.
F. Netter M.D.
C. Machado M.D.

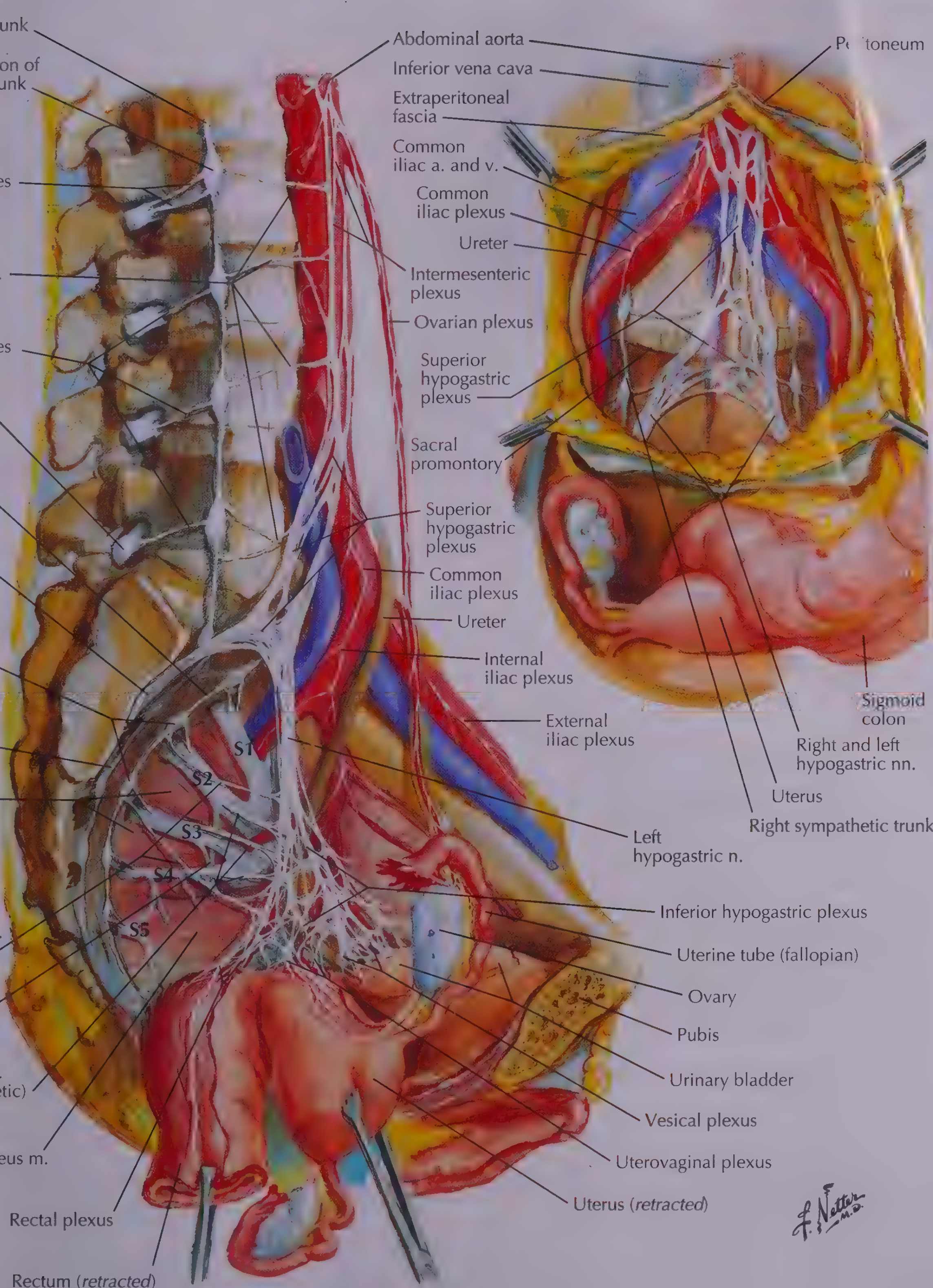
Nerves of Perineum: Male

See also Plate 418


Posterior scrotal nn.
Perineal n.
Superficial branch
Deep branch
Dorsal n. of penis
Perineal membrane (*cut to show neurovascular structures on superior aspect of perineal membrane*)
Dorsal n. of penis
Membranous layer of perineal subcutaneous tissue (Colles' fascia) (*cut to open superficial perineal space*)
Superficial branch of perineal n.
Deep branch of perineal n.
Dorsal n. of penis (passes superior to perineal membrane)
Perineal n.
Obturator fascia (of obturator internus)
Posterior femoral cutaneous n.
Pudendal canal (Alcock's) (*opened up*)
Pudendal n.
Inferior gluteal cutaneous nn.
Gluteus maximus m.
Inferior anal nn.
Perforating cutaneous n.
Anococcygeal n.
Sacrotuberous ligament (*cut*)
Piriformis m.
Coccygeus m.
Levator ani
Obturator internus
Ischial spine
Pudendal n.

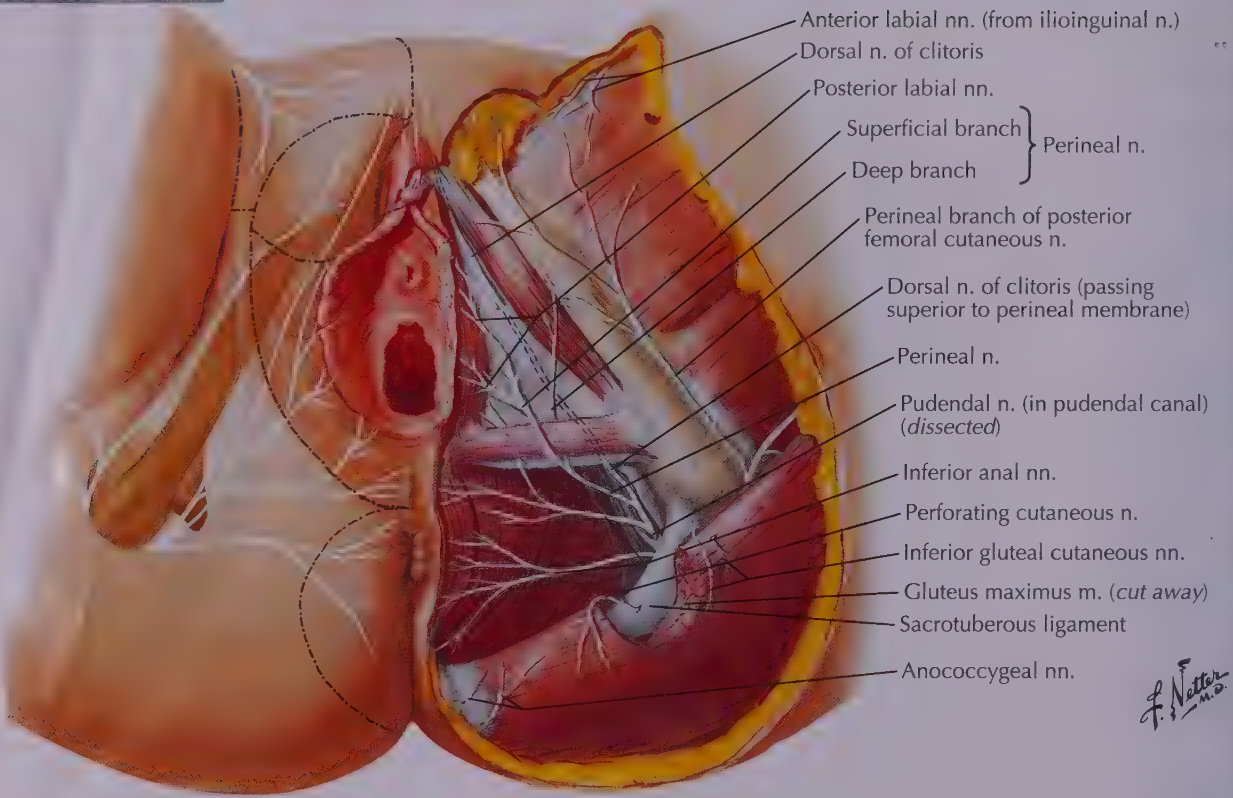
Nerves of Pelvic Viscera: Female

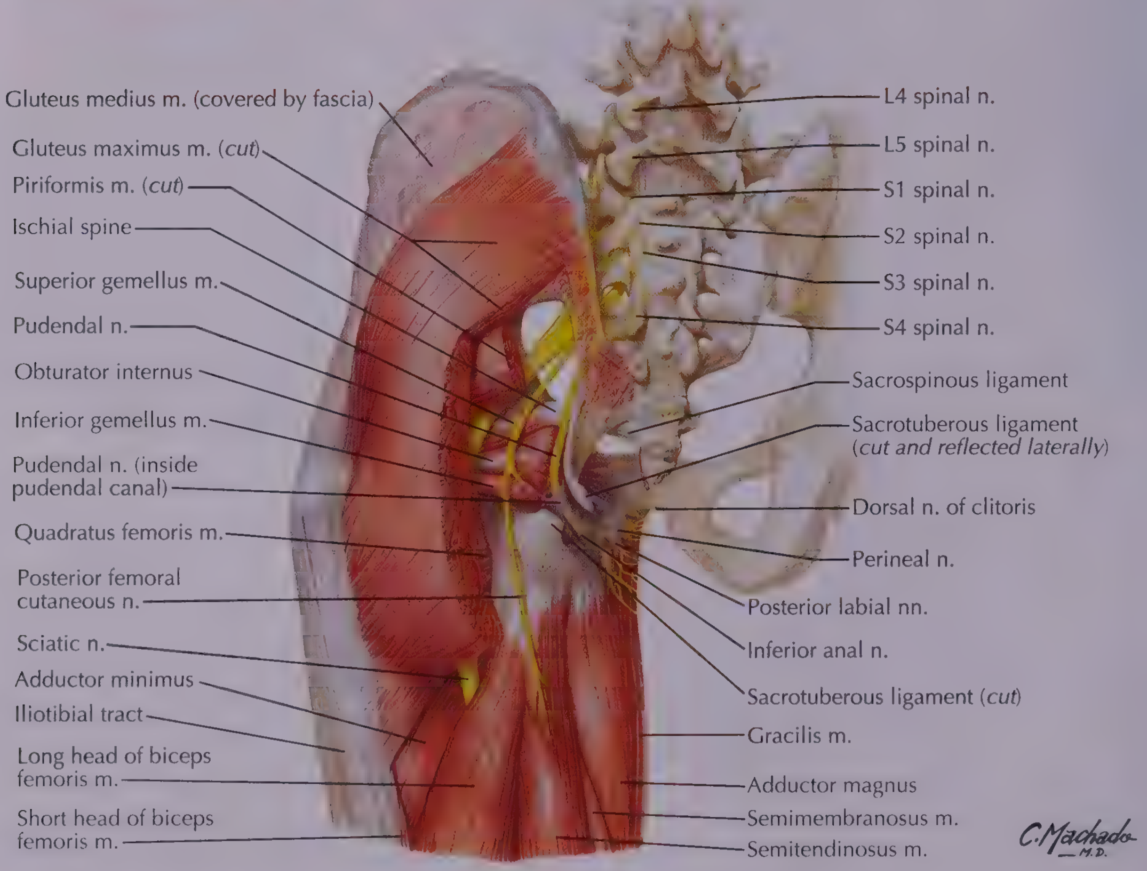
See also Plate 319

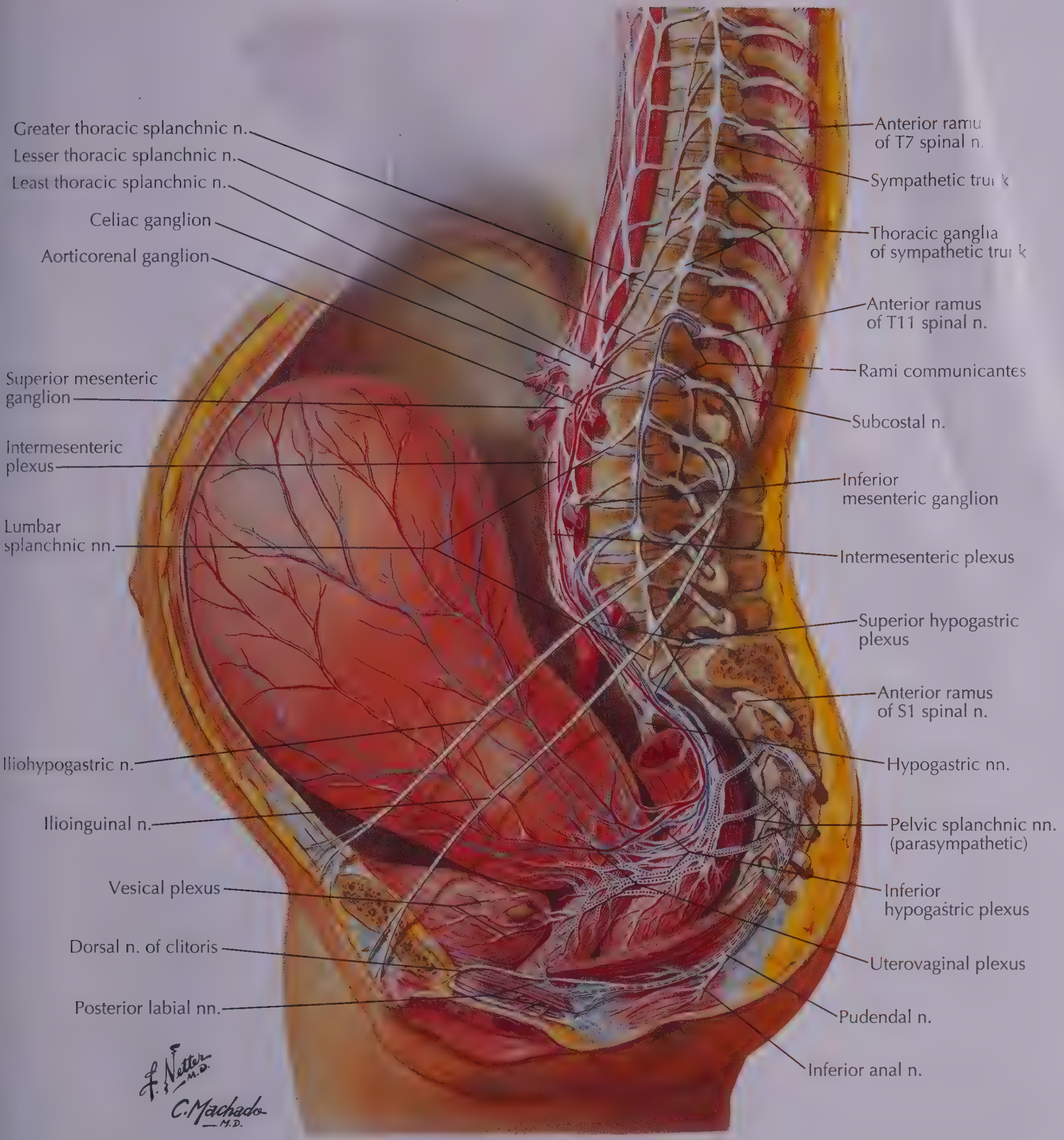

Sympathetic trunk
Lumbar ganglion of sympathetic trunk
White and gray rami communicantes
Lumbar splanchnic nn.
Gray rami communicantes
L5 spinal n.
Left sympathetic trunk
Right hypogastric n. (cut)
Sacral ganglia of sympathetic trunk
Right sympathetic trunk
Piriformis m.
Sacral splanchnic nn. (sympathetic)
Pudendal n.
Pelvic splanchnic nn. (parasympathetic)
Coccygeus m.
Rectal plexus
Rectum (retracted)
Abdominal aorta
Inferior vena cava
Extraperitoneal fascia
Common iliac a. and v.
Common iliac plexus
Ureter
Intermesenteric plexus
Ovarian plexus
Superior hypogastric plexus
Sacral promontory
Superior hypogastric plexus
Common iliac plexus
Ureter
Internal iliac plexus
External iliac plexus
S1
S2
S3
S4
S5
Left hypogastric n.
Inferior hypogastric plexus
Uterine tube (fallopian)
Ovary
Pubis
Urinary bladder
Vesical plexus
Uterovaginal plexus
Uterus (retracted)
Peritoneum
Sigmoid colon
Right and left hypogastric nn.
Uterus
Right sympathetic trunk
F. Netter M.D.

Nerves of Perineum and External Genitalia: Female

See also Plate 417


Anterior labial nn. (from ilioinguinal n.)
Dorsal n. of clitoris
Posterior labial nn.
Superficial branch
Deep branch
Perineal n.
Perineal branch of posterior femoral cutaneous n.
Dorsal n. of clitoris (passing superior to perineal membrane)
Perineal n.
Pudendal n. (in pudendal canal) (*dissected*)
Inferior anal nn.
Perforating cutaneous n.
Inferior gluteal cutaneous nn.
Gluteus maximus m. (*cut away*)
Sacrotuberous ligament
Anococcygeal nn.
F. Netter M.D.


Gluteus medius m. (covered by fascia)
Gluteus maximus m. (*cut*)
Piriformis m. (*cut*)
Ischial spine
Superior gemellus m.
Pudendal n.
Obturator internus
Inferior gemellus m.
Pudendal n. (inside pudendal canal)
Quadratus femoris m.
Posterior femoral cutaneous n.
Sciatic n.
Adductor minimus
Iliotibial tract
Long head of biceps femoris m.
Short head of biceps femoris m.
L4 spinal n.
L5 spinal n.
S1 spinal n.
S2 spinal n.
S3 spinal n.
S4 spinal n.
Sacrospinous ligament
Sacrotuberous ligament (*cut and reflected laterally*)
Dorsal n. of clitoris
Perineal n.
Posterior labial nn.
Inferior anal n.
Sacrotuberous ligament (*cut*)
Gracilis m.
Adductor magnus
Semimembranosus m.
Semitendinosus m.
C. Machado M.D.


Greater thoracic splanchnic n.
Lesser thoracic splanchnic n.
Least thoracic splanchnic n.
Celiac ganglion
Aorticorenal ganglion
Superior mesenteric ganglion
Intermesenteric plexus
Lumbar splanchnic nn.
Iliohypogastric n.
Ilioinguinal n.
Vesical plexus
Dorsal n. of clitoris
Posterior labial nn.
Anterior ramu of T7 spinal n.
Sympathetic trunk
Thoracic ganglia of sympathetic trunk
Anterior ramus of T11 spinal n.
Rami communicantes
Subcostal n.
Inferior mesenteric ganglion
Intermesenteric plexus
Superior hypogastric plexus
Anterior ramus of S1 spinal n.
Hypogastric nn.
Pelvic splanchnic nn. (parasympathetic)
Inferior hypogastric plexus
Uterovaginal plexus
Pudendal n.
Inferior anal n.

— Sensory fibers from body and fundus of uterus accompany sympathetic fibers to lower thoracic part of spinal cord via hypogastric plexuses

— Sympathetic fibers to body and fundus of uterus

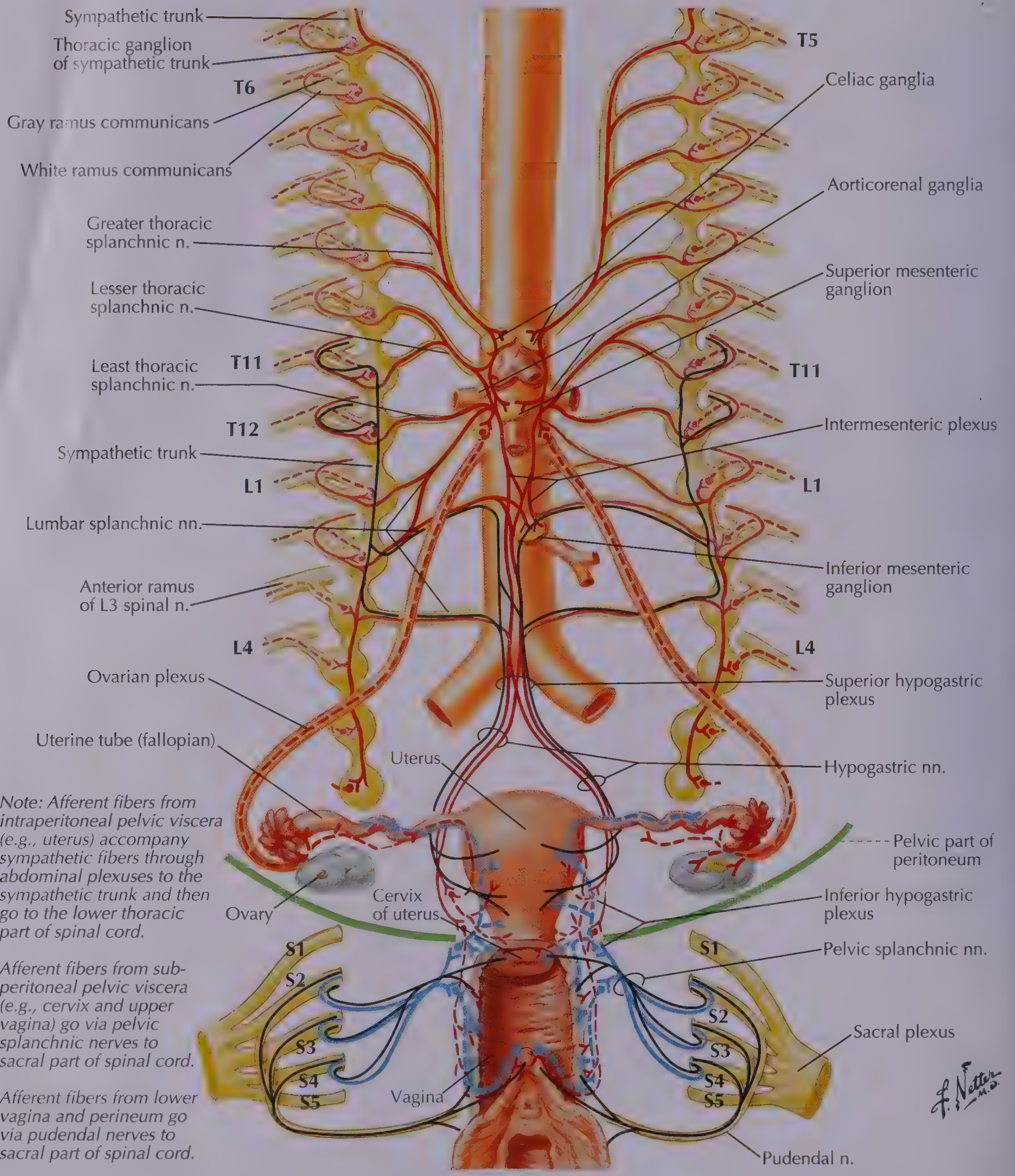
⋯⋯ Sensory fibers from cervix and upper vagina accompany parasympathetic fibers to sacral part of spinal cord via pelvic splanchnic nerves

⋯⋯ Parasympathetic fibers to lower uterine segment, cervix, and upper vagina

– – – – Sensory fibers from lower vagina and perineum accompany somatic motor fibers to sacral part of spinal cord via pudendal nerve

- - - - - - Somatic motor fibers to lower vagina and perineum via pudendal nerve

Innervation of Female Reproductive Organs: Schema


Sympathetic trunk
Thoracic ganglion of sympathetic trunk
T6
Gray ramus communicans
White ramus communicans
Greater thoracic splanchnic n.
Lesser thoracic splanchnic n.
Least thoracic splanchnic n.
T11
T12
Sympathetic trunk
L1
Lumbar splanchnic nn.
Anterior ramus of L3 spinal n.
L4
Ovarian plexus
Uterine tube (fallopian)
Uterus
Ovary
Cervix of uterus
S1
S2
S3
S4
S5
Vagina
T5
Celiac ganglia
Aorticorenal ganglia
Superior mesenteric ganglion
T11
Intermesenteric plexus
L1
Inferior mesenteric ganglion
L4
Superior hypogastric plexus
Hypogastric nn.
Pelvic part of peritoneum
Inferior hypogastric plexus
S1
Pelvic splanchnic nn.
S2
S3
S4
S5
Sacral plexus
Pudendal n.
F. Netter M.D.

Note: Afferent fibers from intraperitoneal pelvic viscera (e.g., uterus) accompany sympathetic fibers through abdominal plexuses to the sympathetic trunk and then go to the lower thoracic part of spinal cord.

Afferent fibers from subperitoneal pelvic viscera (e.g., cervix and upper vagina) go via pelvic splanchnic nerves to sacral part of spinal cord.

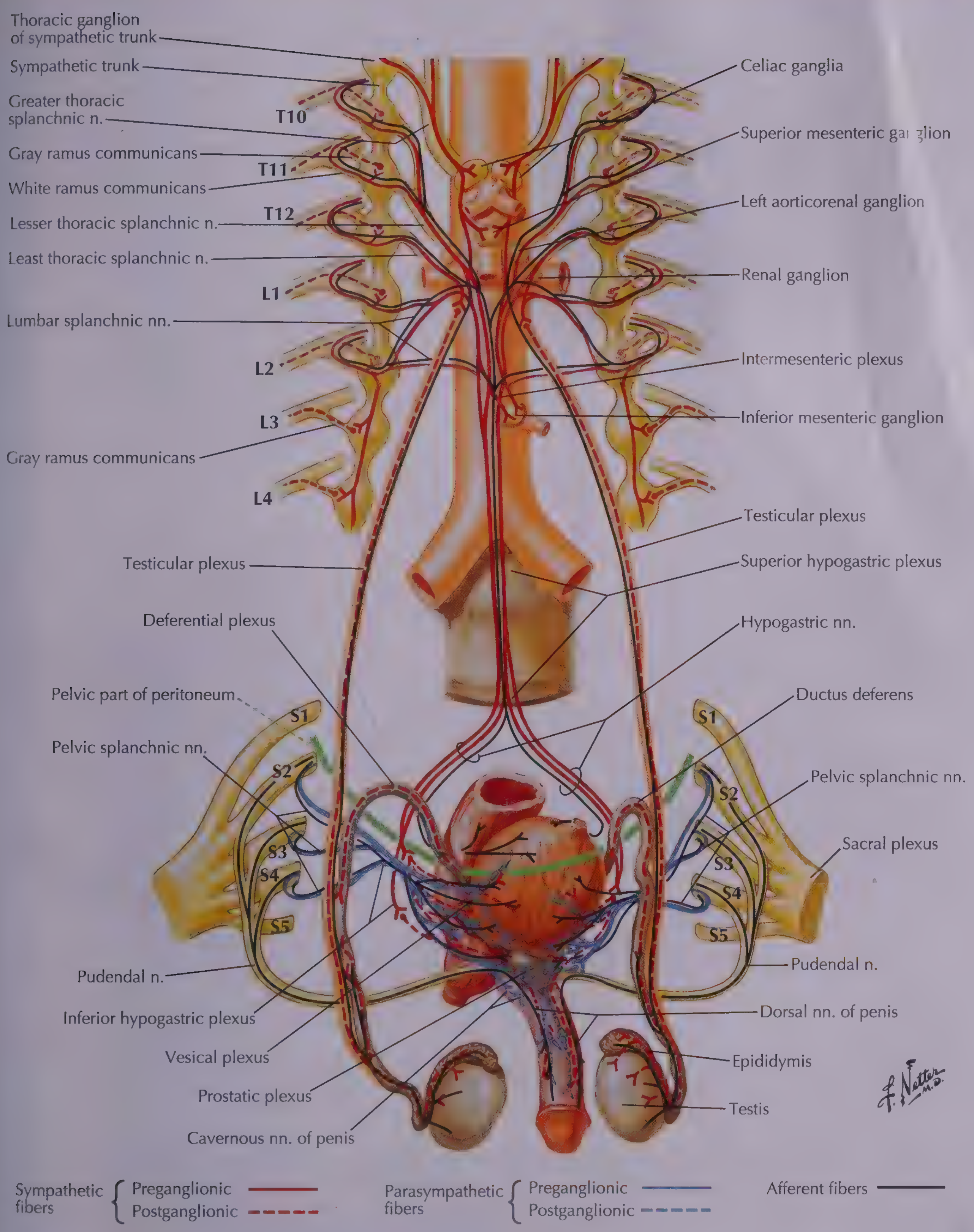
Afferent fibers from lower vagina and perineum go via pudendal nerves to sacral part of spinal cord.

Sympathetic fibers { **Preganglionic** ——— **Postganglionic** - - - -

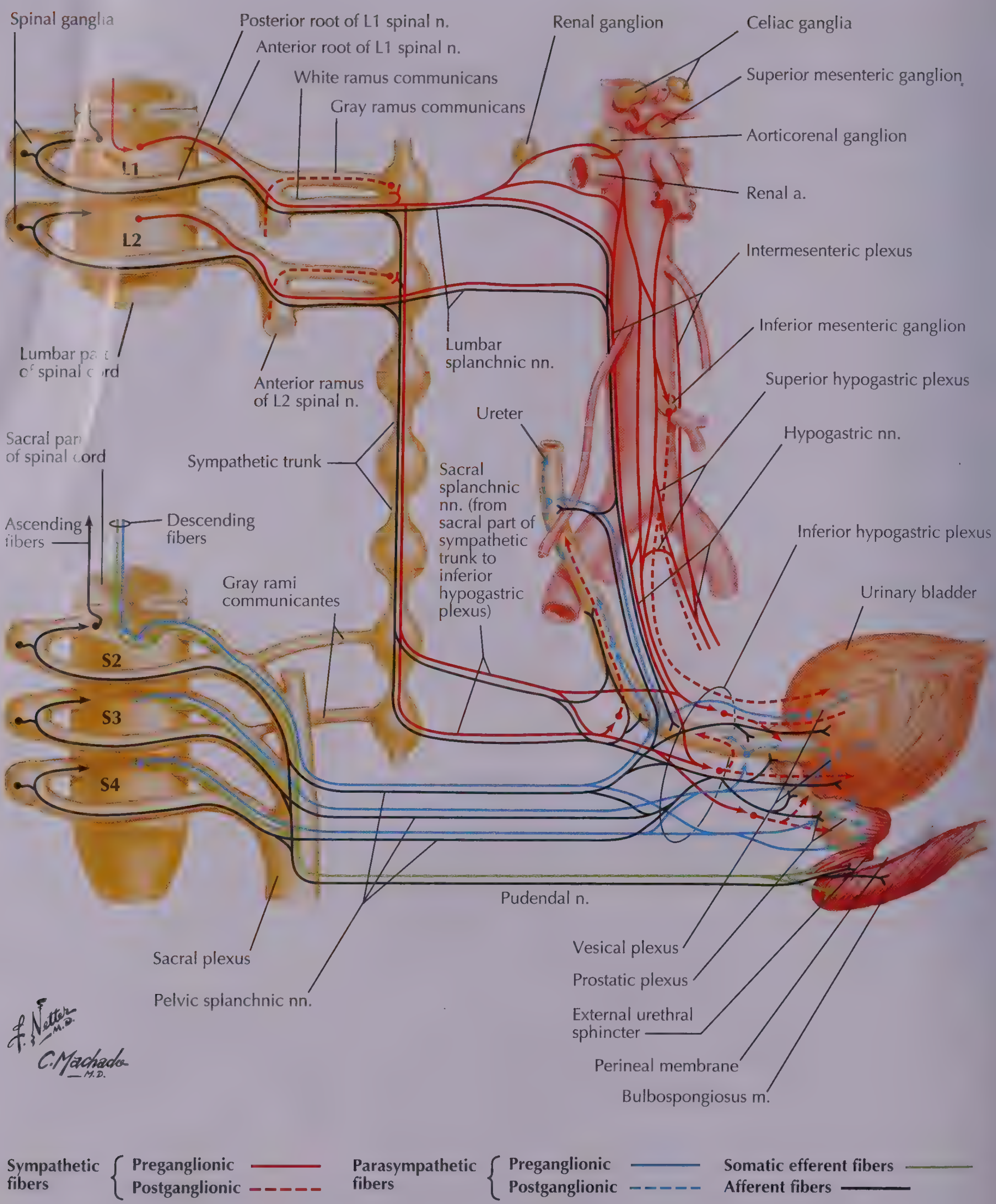
Parasympathetic fibers { **Preganglionic** ——— **Postganglionic** - - - -

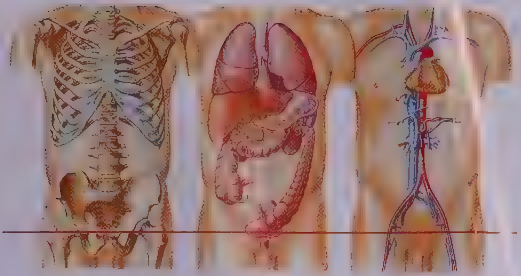
Afferent fibers ———

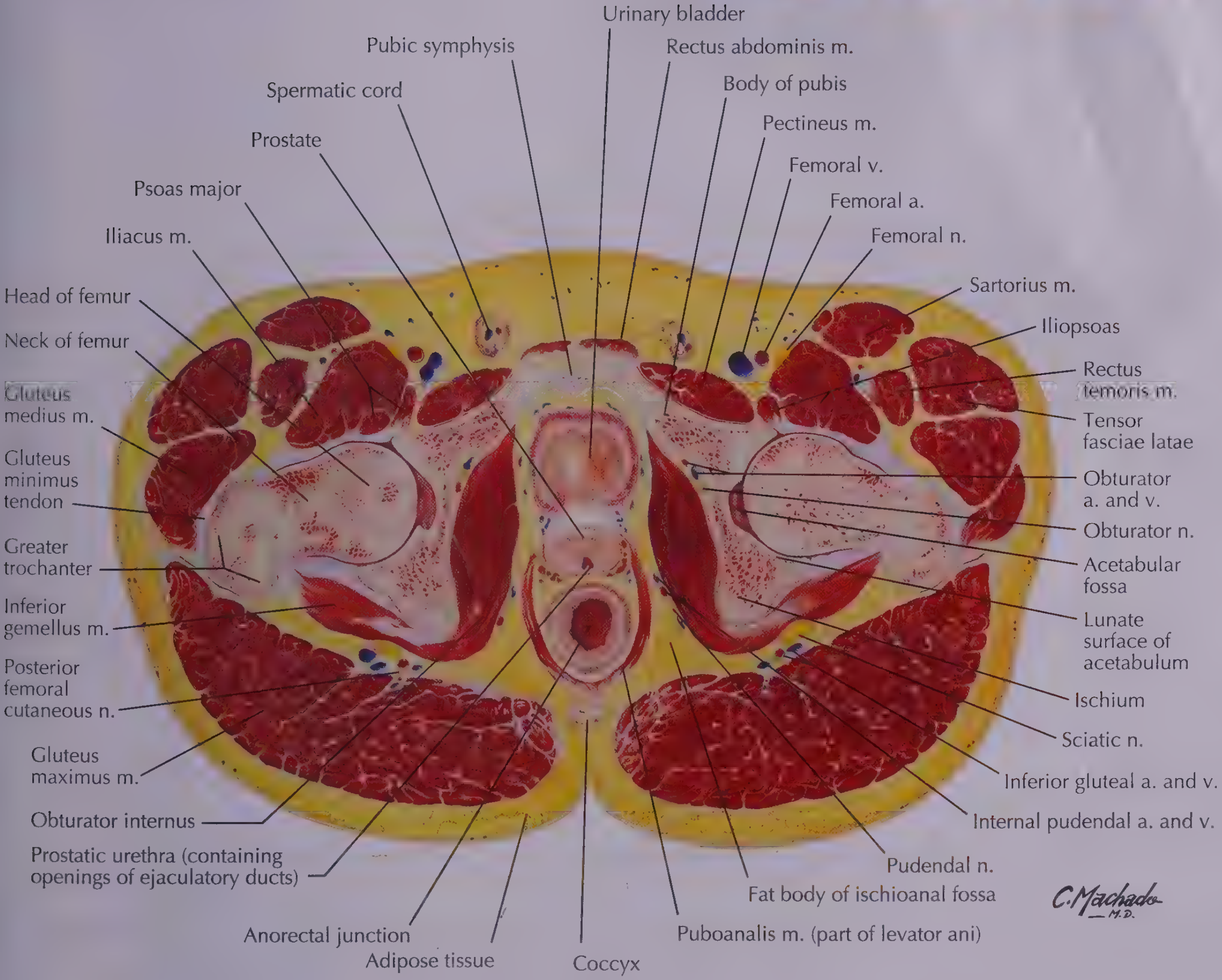
Innervation of Male Reproductive Organs: Schema


Thoracic ganglion of sympathetic trunk
Sympathetic trunk
Greater thoracic splanchnic n.
Gray ramus communicans
White ramus communicans
Lesser thoracic splanchnic n.
Least thoracic splanchnic n.
Lumbar splanchnic nn.
Gray ramus communicans
Testicular plexus
Deferential plexus
Pelvic part of peritoneum
Pelvic splanchnic nn.
Pudendal n.
Inferior hypogastric plexus
Vesical plexus
Prostatic plexus
Cavernous nn. of penis
T10
T11
T12
L1
L2
L3
L4
S1
S2
S3
S4
S5
Celiac ganglia
Superior mesenteric ganglion
Left aorticorenal ganglion
Renal ganglion
Intermesenteric plexus
Inferior mesenteric ganglion
Testicular plexus
Superior hypogastric plexus
Hypogastric nn.
Ductus deferens
Pelvic splanchnic nn.
Sacral plexus
Pudendal n.
Dorsal nn. of penis
Epididymis
Testis
F. Netter M.D.
Sympathetic fibers
Preganglionic
Postganglionic
Parasympathetic fibers
Preganglionic
Postganglionic
Afferent fibers

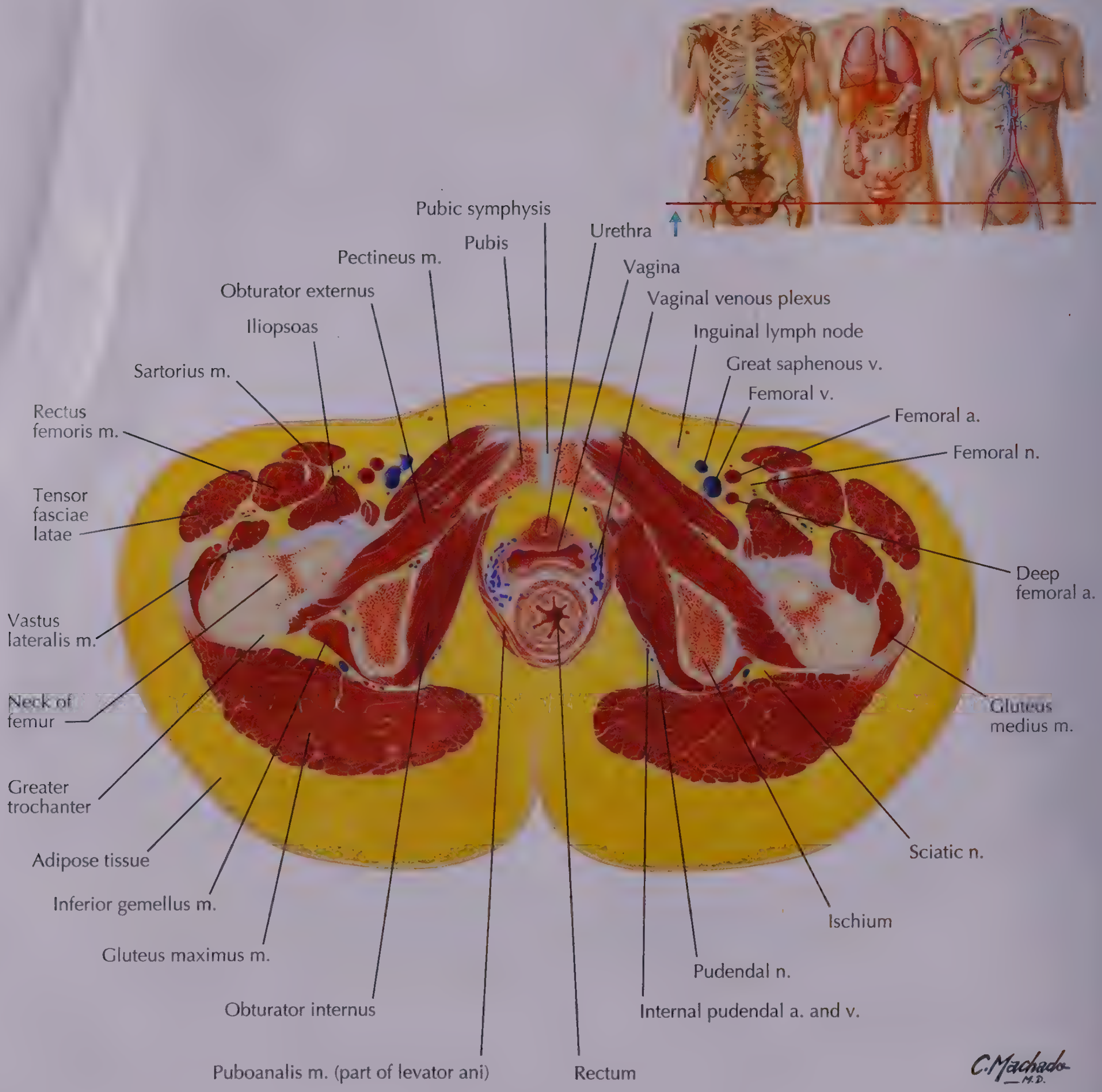
Innervation of Urinary Bladder and Lower Ureter: Schema


Spinal ganglia
Posterior root of L1 spinal n.
Anterior root of L1 spinal n.
White ramus communicans
Gray ramus communicans
Renal ganglion
Celiac ganglia
Superior mesenteric ganglion
Aorticorenal ganglion
Renal a.
Intermesenteric plexus
Inferior mesenteric ganglion
Superior hypogastric plexus
Hypogastric nn.
Inferior hypogastric plexus
Urinary bladder
L1
L2
Lumbar part of spinal cord
Anterior ramus of L2 spinal n.
Lumbar splanchnic nn.
Ureter
Sacral part of spinal cord
Sympathetic trunk
Sacral splanchnic nn. (from sacral part of sympathetic trunk to inferior hypogastric plexus)
Ascending fibers
Descending fibers
Gray rami communicantes
S2
S3
S4
Pudendal n.
Sacral plexus
Pelvic splanchnic nn.
Vesical plexus
Prostatic plexus
External urethral sphincter
Perineal membrane
Bulbospongiosus m.
F. Netter M.D.
C. Machado M.D.
Sympathetic fibers
Preganglionic
Postganglionic
Parasympathetic fibers
Preganglionic
Postganglionic
Somatic efferent fibers
Afferent fibers




Urinary bladder
Pubic symphysis
Rectus abdominis m.
Spermatic cord
Body of pubis
Prostate
Pectineus m.
Femoral v.
Psoas major
Femoral a.
Iliacus m.
Femoral n.
Head of femur
Sartorius m.
Neck of femur
Iliopsoas
Gluteus medius m.
Rectus femoris m.
Tensor fasciae latae
Gluteus minimus tendon
Obturator a. and v.
Obturator n.
Greater trochanter
Acetabular fossa
Inferior gemellus m.
Lunate surface of acetabulum
Posterior femoral cutaneous n.
Ischium
Sciatic n.
Gluteus maximus m.
Inferior gluteal a. and v.
Obturator internus
Internal pudendal a. and v.
Prostatic urethra (containing openings of ejaculatory ducts)
Pudendal n.
Fat body of ischioanal fossa
Anorectal junction
Puboanalis m. (part of levator ani)
Adipose tissue
Coccyx
C. Machado M.D.

Female Pelvis: Cross Section of Vagina and Urethra


Pubic symphysis
Urethra
Pubis
Pectineus m.
Vagina
Vaginal venous plexus
Obturator externus
Inguinal lymph node
Iliopsoas
Great saphenous v.
Sartorius m.
Femoral v.
Femoral a.
Rectus femoris m.
Femoral n.
Tensor fasciae latae
Deep femoral a.
Vastus lateralis m.
Neck of femur
Gluteus medius m.
Greater trochanter
Adipose tissue
Sciatic n.
Inferior gemellus m.
Ischium
Gluteus maximus m.
Pudendal n.
Obturator internus
Internal pudendal a. and v.
Puboanalis m. (part of levator ani)
Rectum
C. Machado M.D.

ANATOMICAL STRUCTURE	CLINICAL COMMENT	PLATE NUMBERS
Nervous System and Sense Organs		
Pudendal nerve	Pudendal block is performed to anesthetize the perineum for childbirth or minor surgical procedures in the perineum	415
Inferior anal (rectal) nerve	Anesthetized in ischioanal fossa for surgical excision of external hemorrhoids	413
Prostatic plexus and cavernous nerves	Disruption of these nerves during procedures (e.g., prostate surgery) can produce inability to achieve erection	412
Skeletal System		
Pubic symphysis	Palpable landmark used to obtain pelvic measurements (e.g., diagonal conjugate) that may be used to assess adequacy of pelvis for childbirth; during prenatal examinations, used for estimating fetal growth (symphysis–fundal height measurement); injury may result in widening on x-ray	355
Ischial spine	Palpable landmark used to estimate interspinous diameter for childbirth and to locate pudendal nerve for pudendal nerve block	355
Ischial tuberosity	Palpable landmark used to estimate width of pelvic outlet for childbirth; proximal attachment site of hamstring muscles	355
Superior pubic ramus	Often fractured by lateral compression injury of pelvis in anteroposterior plane by crush injury or falls in elderly with osteoporosis	353
Sacroiliac joint	Stiffening, sclerosis, and fusion occur in autoimmune disease known as ankylosing spondylitis; difficult diagnosis to make and known to refer pain to adjacent joints	355
Muscular System		
Pelvic diaphragm (levator ani and coccygeus muscle)	Provides support to urethrovesical angle, helping to maintain urinary continence; weakness or injury during childbirth can lead to stress urinary incontinence in women	359, 370
Pelvic extraperitoneal (endopelvic) fascia	Weakness or tearing of endopelvic fascial ligaments (e.g., pubovesical or cardinal ligaments) may result in prolapse of pelvic organs	366, 373
Perineal body	Tearing of perineal body may occur during childbirth; prophylactic incision into or lateral to perineal body, known as episiotomy, may be performed to facilitate vaginal delivery in some circumstances	379
Cardiovascular System		
Pampiniform plexus	Dilation of these veins can cause testicular varicocele, affecting testicular temperature regulation and potentially contributing to infertility; most commonly occurs on left side due to longer course of left gonadal vein and angle of drainage into renal vein	403
Uterine artery	Ligated or cauterized during hysterectomy; selective embolization of branches may be performed to treat uterine fibroids	402, 406
Deep and dorsal arteries of penis, and cavernous tissue	Blockage or loss of vascular smooth muscle function can lead to erectile dysfunction, treated with vasodilators	407
Internal iliac veins	Provide communication between prostatic venous plexus and veins draining vertebral column, which is route of spread for prostate cancer	405
Anorectal (rectal) veins	Portal hypertension may cause dilated anorectal veins if portosystemic anastomoses develop between superior anorectal veins (portal drainage) and middle and/or inferior anorectal veins (systemic drainage)	318, 401
Internal and external anorectal (rectal) venous plexuses	Enlargement may result in painful condition known as hemorrhoids	395, 401

Structures with High Clinical Significance **Table 6.1**

ANATOMICAL STRUCTURE	CLINICAL COMMENT	PLATE NUMBERS
Lymph Vessels and Lymphoid Organs		
Pelvic and lumbar nodes	Spread of ovarian cancer cells via venous drainage to inferior vena cava and lungs or via lymphatics	408
Lumbar and tracheobronchial nodes	Prostate cancer cells may spread via lymphatics to retroperitoneum and mediastinum	260, 410
Lumbar (e.g., lateral aortic, preaortic, lateral caval) nodes	Receive lymphatic drainage from ovary, uterine tube, and fundus of uterus in women and from testis in men; cancers in these organs may therefore spread to retroperitoneum	408, 410
Pelvic nodes	Sampling or dissection is performed to assess spread of gynecological malignancies	408
Digestive System		
Rectum and anal canal	Examined by digital rectal examination to detect internal hemorrhoids, fecal impaction, and rectal cancer	301, 393, 395
Peritoneum	Common site for metastatic spread of ovarian cancer via fluid in peritoneal cavity	363, 364
Urinary System		
Urinary bladder	Degree of filling is readily assessed with ultrasound; in patients with poor urine output, this can establish diagnosis of bladder outlet obstruction	368, 369
Ureteric orifice	Abnormal reflux of urine from urinary bladder to ureters (vesicoureteral reflux) may occur in children, contributing to recurrent urinary infections and progressive renal fibrosis	371
Ureter	Enlargement indicates obstruction of ureter or urinary bladder; impaction of renal stone in ureter causes severe pain and, in some cases, hematuria; ureter may be injured during hysterectomy because of its close relationship to uterine artery	335, 336, 402
Reproductive System		
Rectouterine pouch (of Douglas)	Region examined with ultrasound to detect presence of abdominopelvic fluid; common site of ectopic pregnancy; may be accessed via posterior vaginal fornix; normally contains small, physiologic amount of peritoneal fluid	364, 365
Uterus	Site of fetal gestation; palpated during prenatal examinations to assess fetal growth; can also contain large, sometimes painful growths known as leiomyomas (fibroids)	364, 374
Uterine tubes (fallopian)	Common site of ectopic pregnancy; inflammation (salpingitis) may occur in pelvic inflammatory disease (PID), the result of sexually transmitted infection, possibly leading to fibrosis and infertility; surgical occlusion (tubal ligation) is performed when women desire permanent contraception	363, 364, 375
Cervix of uterus	Epithelium of transformation zone of cervix is prone to dysplasia and malignancy; cells are sampled from this region during Pap smear examination and tested for infection with human papillomavirus, the leading risk factor for cervical malignancy	372, 374
Vagina	Posterior part of vaginal fornix allows access to rectouterine pouch (of Douglas)	364
Ovary	Examined with ultrasound to identify cysts, or for oocyte collection; torsion is painful condition that occurs when ovary twists on axis of suspensory ligament of ovary, occluding ovarian vessels and causing engorgement and ischemia	363, 374, 375
Testis	Torsion is painful condition that occurs when testis twists on axis of testicular vasculature, causing engorgement and ischemia	388

ANATOMICAL STRUCTURE	CLINICAL COMMENT	PLATE NUMBERS
Prostate	Prone to benign hypertrophy with aging, which results in urinary outflow obstruction; prostate cancer is second most common cancer in men	368, 385
Ductus deferens	Ligation (vasectomy) performed when men desire permanent contraception	368, 388

*Selections were based largely on clinical data and commonly discussed clinical correlations in macroscopic ("gross") anatomy courses

MUSCLE	MUSCLE GROUP	ORIGIN ATTACHMENT	INSERTION ATTACHMENT	INNERVATION	BLOOD SUPPLY	MAIN ACTIONS
Bulbospongiosus m.	Perineal	*Male:* perineal body	*Male:* perineal membrane, corpus cavernosum, bulb of penis	Perineal nerve	Perineal artery	*Male:* compresses bulb of penis, forces blood into body of penis during erection, propels urine and semen through urethra
		Female: perineal body	*Female:* dorsum of clitoris, perineal membrane, bulb of vestibule, pubic arch			*Female:* constricts vaginal orifice, assists in expressing secretions of greater vestibular gland, forces blood into body of clitoris
Coccygeus m.	Pelvic diaphragm	Ischial spine	Inferior sacrum, coccyx	Nerve to coccygeus muscle	Inferior gluteal artery	Supports pelvic viscera
Compressor urethrae (female only)	Perineal	Ischiopubic ramus	Merges with contralateral partner anterior to urethra	Perineal nerve	Perineal artery	Sphincter of urethra
Cremaster	Spermatic cord	Inferior edge of internal abdominal oblique muscle, middle of inguinal ligament	Pubic tubercle, pubic crest	Genital branch of genitofemoral nerve	Cremasteric artery	Retracts testis
Deep transverse perineal m.	Perineal	Internal surface of ramus of ischium, ischial tuberosity	Perineal body	Perineal nerve	Perineal artery	Stabilizes perineal body, supports prostate/vagina
External anal sphincter	Perineal	Anococcygeal ligament	Perineal body	Perineal and inferior anal nerves	Inferior anorectal and perineal arteries	Closes anal orifice
External urethral sphincter	Perineal	Ischiopubic ramus	*Male:* median raphe in front and behind urethra	Perineal nerve	Perineal artery	Compresses urethra at end of micturition; in female also compresses distal vagina
			Female: encloses urethra, attaches to sides of vagina			
Ischiocavernosus m.	Perineal	Inferior internal surface of ramus of ischium, ischial tuberosity	*Male:* anterior end of crus of penis	Perineal nerve	Perineal artery	Forces blood into body of penis and clitoris during erection
			Female: anterior end of crus of clitoris			
Levator ani (iliococcygeus, pubococcygeus, and puboanalis) mm.	Pelvic diaphragm	Body of pubis, tendinous arch of levator ani (on obturator fascia), ischial spine	Perineal body, coccyx, raphe of pelvic diaphragm, walls of prostate or vagina, anorectal junction	Nerve to levator ani, perineal nerve	Inferior gluteal artery, internal pudendal artery and its branches (inferior anorectal and perineal arteries)	Supports pelvic viscera, elevates pelvic floor
Sphincter urethrovaginalis (female only)	Perineal	Perineal body	Passes anteriorly around urethra and merges with its contralateral partner	Perineal nerve	Perineal artery	Sphincter of urethra and vagina
Superficial transverse perineal m.	Perineal	Ramus of ischium, ischial tuberosity	Perineal body	Perineal nerve	Perineal artery	Stabilizes perineal body

Variations in spinal nerve contributions to the innervation of muscles, their arterial supply, their attachments, and their actions are common themes in human anatomy. Therefore, expect differences between texts and realize that anatomical variation is normal.

UPPER LIMB 7

Surface Anatomy 422–426
Shoulder and Axilla 427–439
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Elbow and Forearm 446–461
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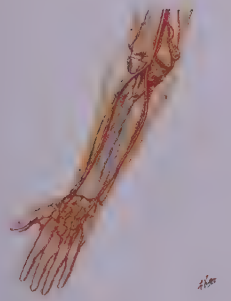
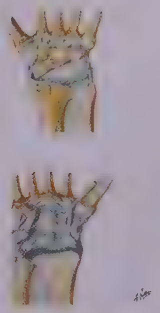
Nerves and Vasculature 482–489
Regional Imaging 490
Structures with High Clinical Significance Tables 7.1–7.
Nerves of Brachial Plexus Tables 7.3–7.4
Muscles Tables 7.5–7.8
Electronic Bonus Plates BP 96–BP 102

ELECTRONIC BONUS PLATES

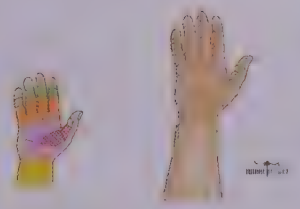
BP 96 Arteries of Arm and Proximal Forearm



BP 97 Arteries of Forearm and Hand



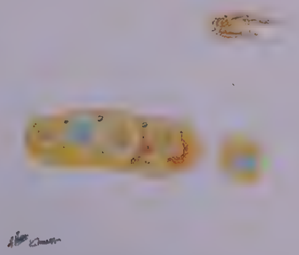
BP 98 Ligaments of Wrist: Posterior and Anterior Views



BP 99 Flexor and Extensor Zones of Hand

BP 100 Cross Sections Through Metacarpal and Distal Carpal Bones

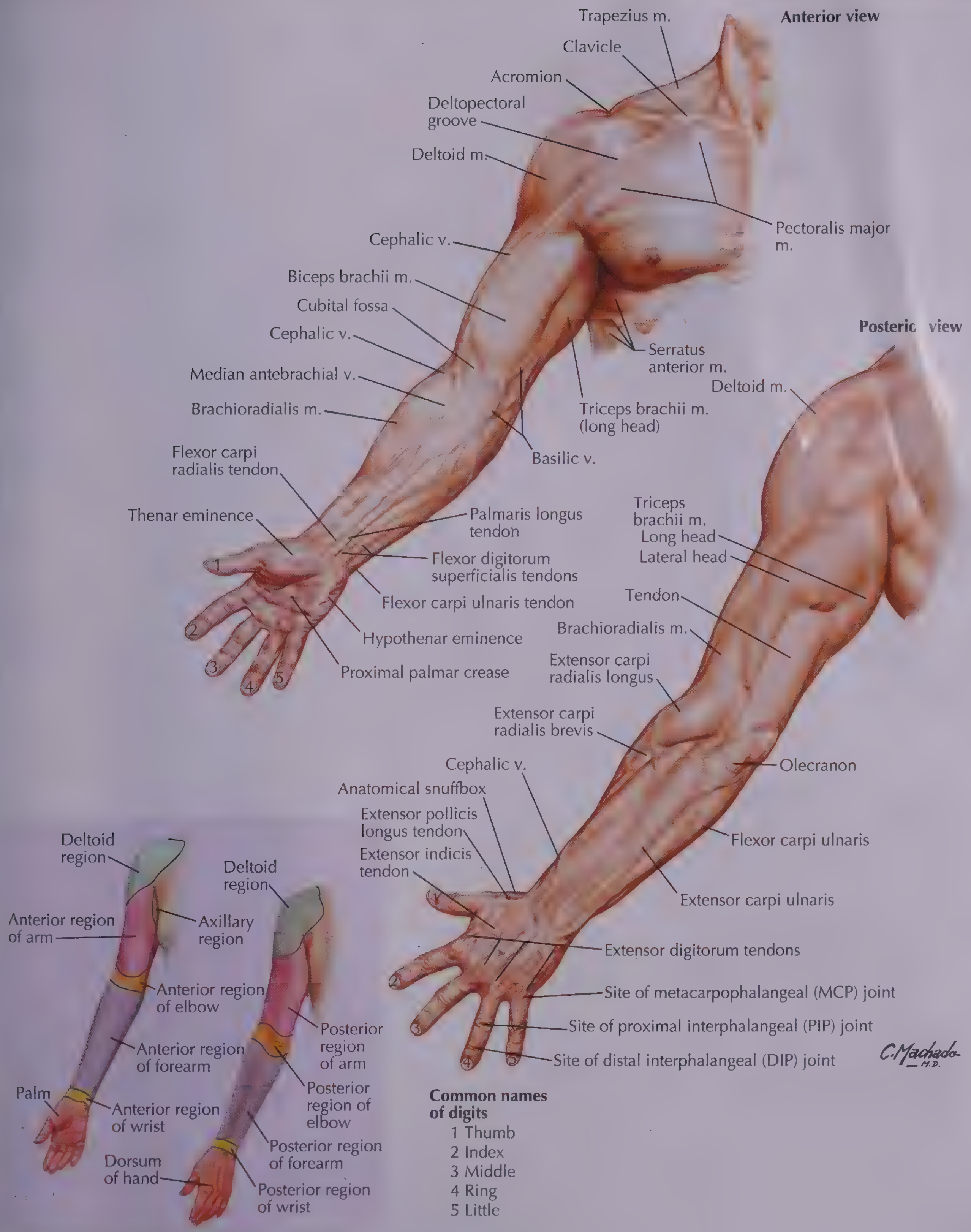
BP 101 Cross Section of Hand: Axial View



BP 102 Cross Section of Hand: Axial View (Continued)

Surface Anatomy of Upper Limb

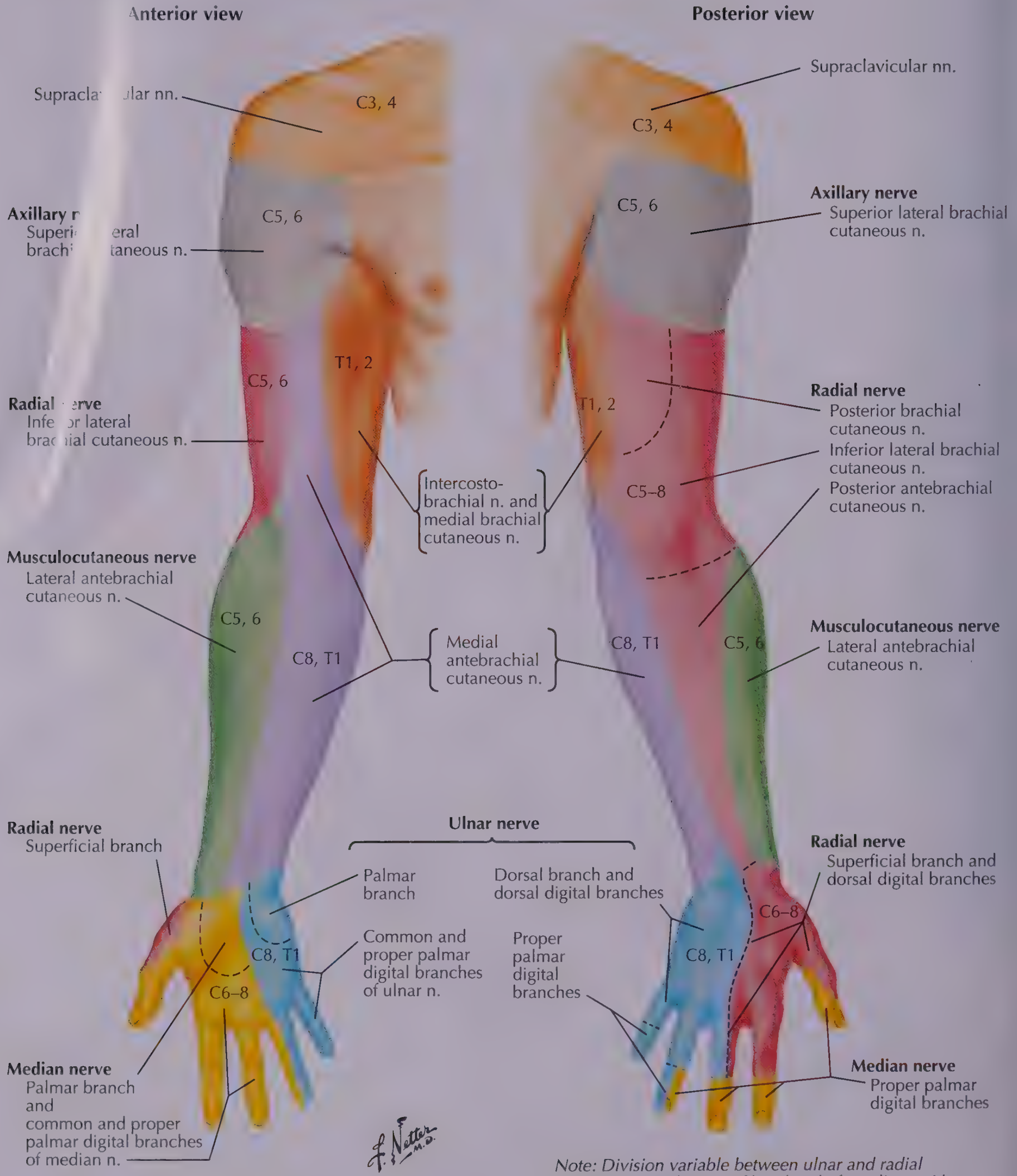
See also Plates 5, 178, 267


Anterior view
Trapezius m.
Clavicle
Acromion
Deltopectoral groove
Deltoid m.
Pectoralis major m.
Cephalic v.
Biceps brachii m.
Cubital fossa
Cephalic v.
Median antebrachial v.
Brachioradialis m.
Serratus anterior m.
Triceps brachii m. (long head)
Basilic v.
Flexor carpi radialis tendon
Thenar eminence
Palmaris longus tendon
Flexor digitorum superficialis tendons
Flexor carpi ulnaris tendon
Hypothenar eminence
Proximal palmar crease
1
2
3
4
5
Posterio view
Deltoid m.
Triceps brachii m.
Long head
Lateral head
Tendon
Brachioradialis m.
Extensor carpi radialis longus
Extensor carpi radialis brevis
Olecranon
Cephalic v.
Anatomical snuffbox
Extensor pollicis longus tendon
Extensor indicis tendon
Flexor carpi ulnaris
Extensor carpi ulnaris
Extensor digitorum tendons
Site of metacarpophalangeal (MCP) joint
Site of proximal interphalangeal (PIP) joint
Site of distal interphalangeal (DIP) joint
1
2
3
4
5
Deltoid region
Anterior region of arm
Axillary region
Anterior region of elbow
Anterior region of forearm
Palm
Anterior region of wrist
Dorsum of hand
Deltoid region
Posterior region of arm
Posterior region of elbow
Posterior region of forearm
Posterior region of wrist
C.Machado M.D.

Common names of digits

1 Thumb
2 Index
3 Middle
4 Ring
5 Little

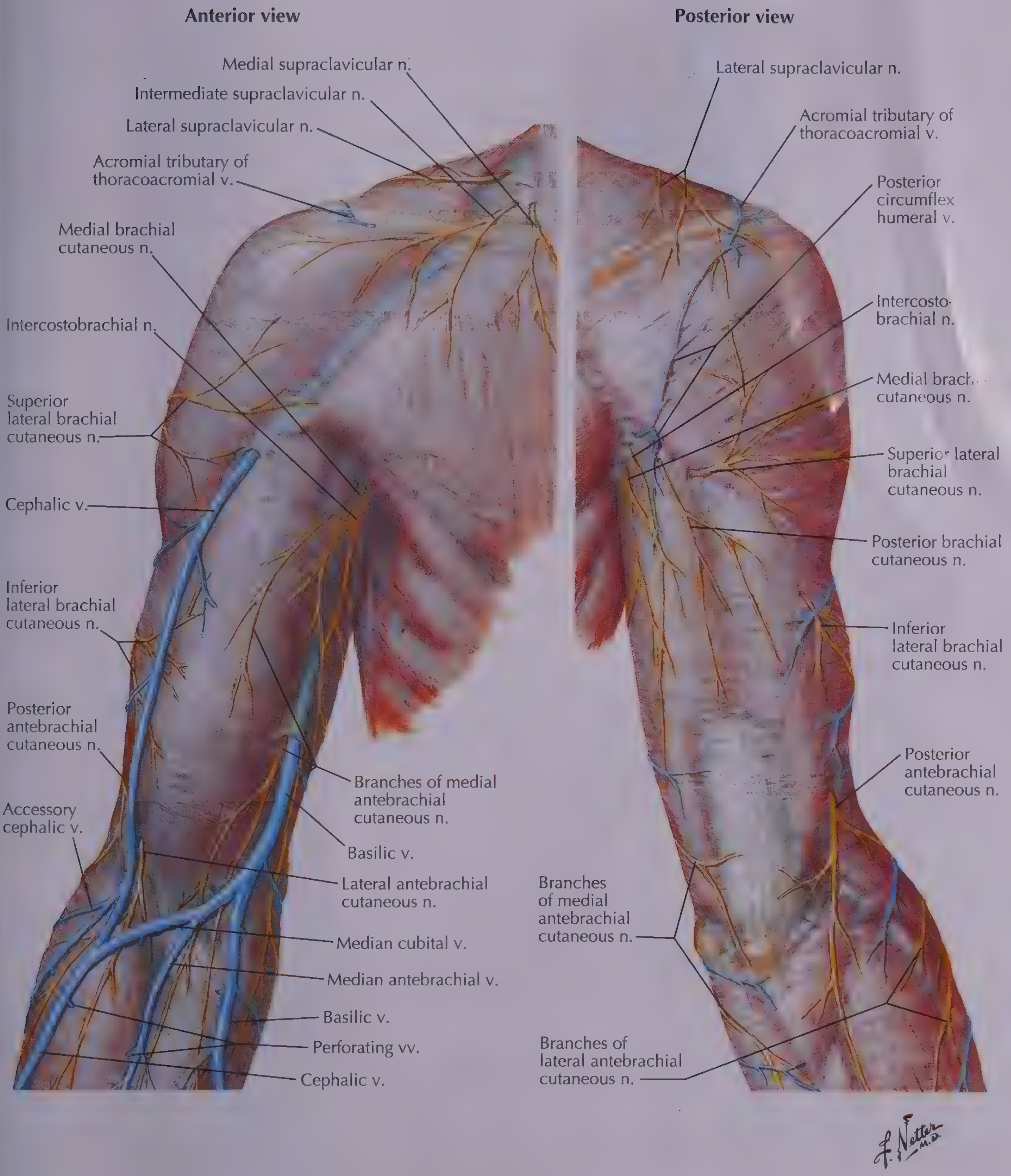
See also Plates 6, 482, 484


Anterior view
Posterior view
Supraclavicular nn.
C3, 4
Axillary nerve
Superior lateral brachial cutaneous n.
C5, 6
T1, 2
Radial nerve
Inferior lateral brachial cutaneous n.
Intercostobrachial n. and medial brachial cutaneous n.
Musculocutaneous nerve
Lateral antebrachial cutaneous n.
C8, T1
Medial antebrachial cutaneous n.
Radial nerve
Superficial branch
Ulnar nerve
Palmar branch
Dorsal branch and dorsal digital branches
Common and proper palmar digital branches of ulnar n.
Proper palmar digital branches
C6–8
Median nerve
Palmar branch and common and proper palmar digital branches of median n.
Supraclavicular nn.
C3, 4
Axillary nerve
Superior lateral brachial cutaneous n.
C5, 6
Radial nerve
Posterior brachial cutaneous n.
Inferior lateral brachial cutaneous n.
Posterior antebrachial cutaneous n.
T1, 2
C5–8
Musculocutaneous nerve
Lateral antebrachial cutaneous n.
C8, T1
C5, 6
Radial nerve
Superficial branch and dorsal digital branches
C6–8
C8, T1
Median nerve
Proper palmar digital branches
F. Netter M.D.

Note: Division variable between ulnar and radial innervation on dorsum of hand and often aligns with middle of 4th digit instead of 3rd digit as shown.

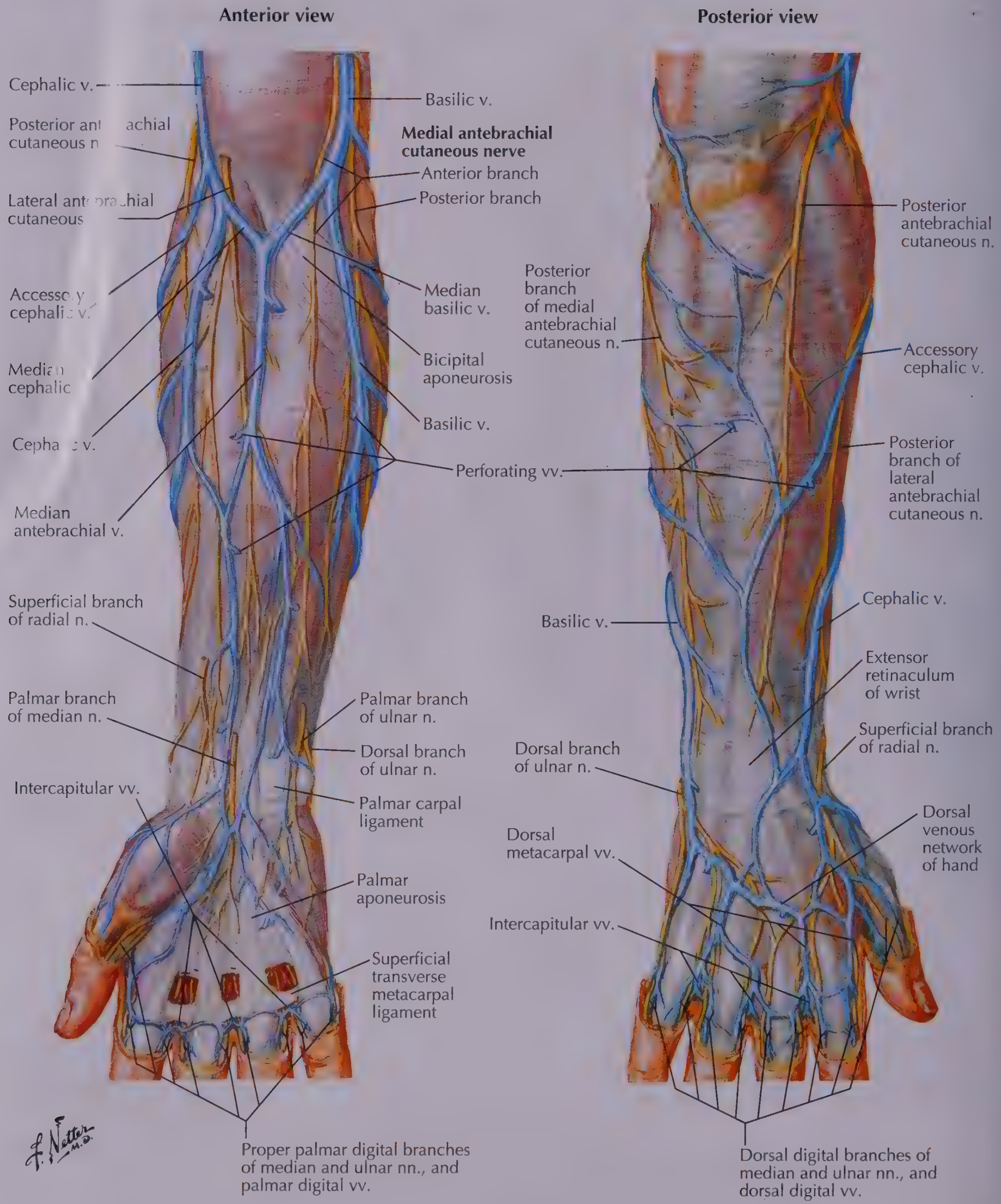
Superficial Veins of Proximal Upper Limb

See also Plates 277, 426, 444


Anterior view
Medial supraclavicular n.
Intermediate supraclavicular n.
Lateral supraclavicular n.
Acromial tributary of thoracoacromial v.
Medial brachial cutaneous n.
Intercostobrachial n.
Superior lateral brachial cutaneous n.
Cephalic v.
Inferior lateral brachial cutaneous n.
Posterior antebrachial cutaneous n.
Accessory cephalic v.
Branches of medial antebrachial cutaneous n.
Basilic v.
Lateral antebrachial cutaneous n.
Median cubital v.
Median antebrachial v.
Basilic v.
Perforating vv.
Cephalic v.
Posterior view
Lateral supraclavicular n.
Acromial tributary of thoracoacromial v.
Posterior circumflex humeral v.
Intercostobrachial n.
Medial brachial cutaneous n.
Superior lateral brachial cutaneous n.
Posterior brachial cutaneous n.
Inferior lateral brachial cutaneous n.
Posterior antebrachial cutaneous n.
Branches of medial antebrachial cutaneous n.
Branches of lateral antebrachial cutaneous n.

Superficial Veins of Forearm and Hand

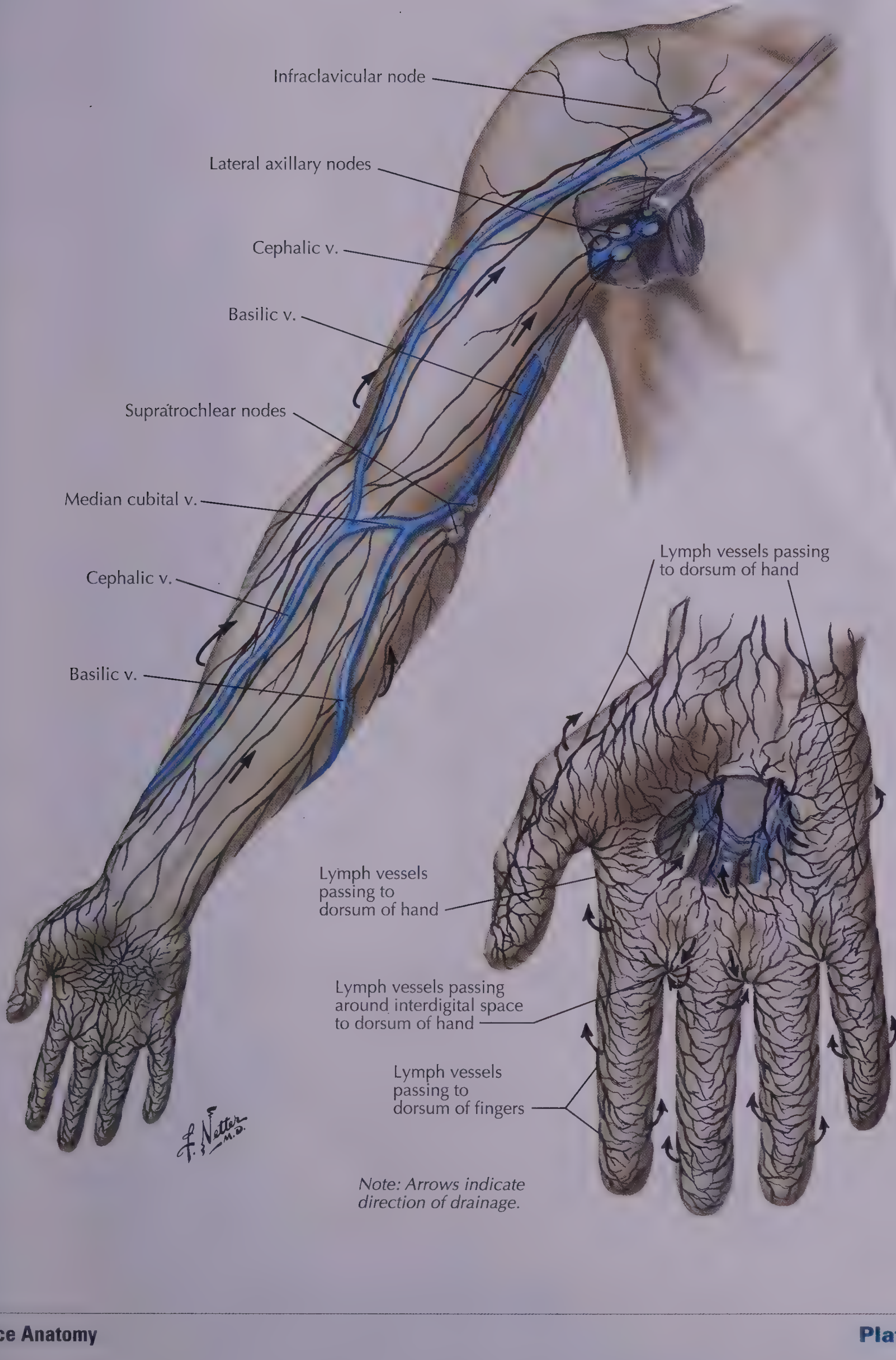
See also Plates 423, 444, 478


Anterior view
Posterior view
Cephalic v.
Posterior antebrachial cutaneous n.
Lateral antebrachial cutaneous
Accessory cephalic v.
Median cephalic
Cephalic v.
Median antebrachial v.
Superficial branch of radial n.
Palmar branch of median n.
Intercapitular vv.
Basilic v.
Medial antebrachial cutaneous nerve
Anterior branch
Posterior branch
Median basilic v.
Bicipital aponeurosis
Basilic v.
Perforating vv.
Palmar branch of ulnar n.
Dorsal branch of ulnar n.
Palmar carpal ligament
Palmar aponeurosis
Superficial transverse metacarpal ligament
Proper palmar digital branches of median and ulnar nn., and palmar digital vv.
Posterior branch of medial antebrachial cutaneous n.
Basilic v.
Dorsal branch of ulnar n.
Dorsal metacarpal vv.
Intercapitular vv.
Posterior antebrachial cutaneous n.
Accessory cephalic v.
Posterior branch of lateral antebrachial cutaneous n.
Cephalic v.
Extensor retinaculum of wrist
Superficial branch of radial n.
Dorsal venous network of hand
Dorsal digital branches of median and ulnar nn., and dorsal digital vv.
F. Netter M.D.

Note: In 70% of cases, a median cubital vein (a tributary to the basilic vein) replaces the median cephalic and median basilic veins (see Plate 424).

Lymph Vessels and Lymph Nodes of Upper Limb

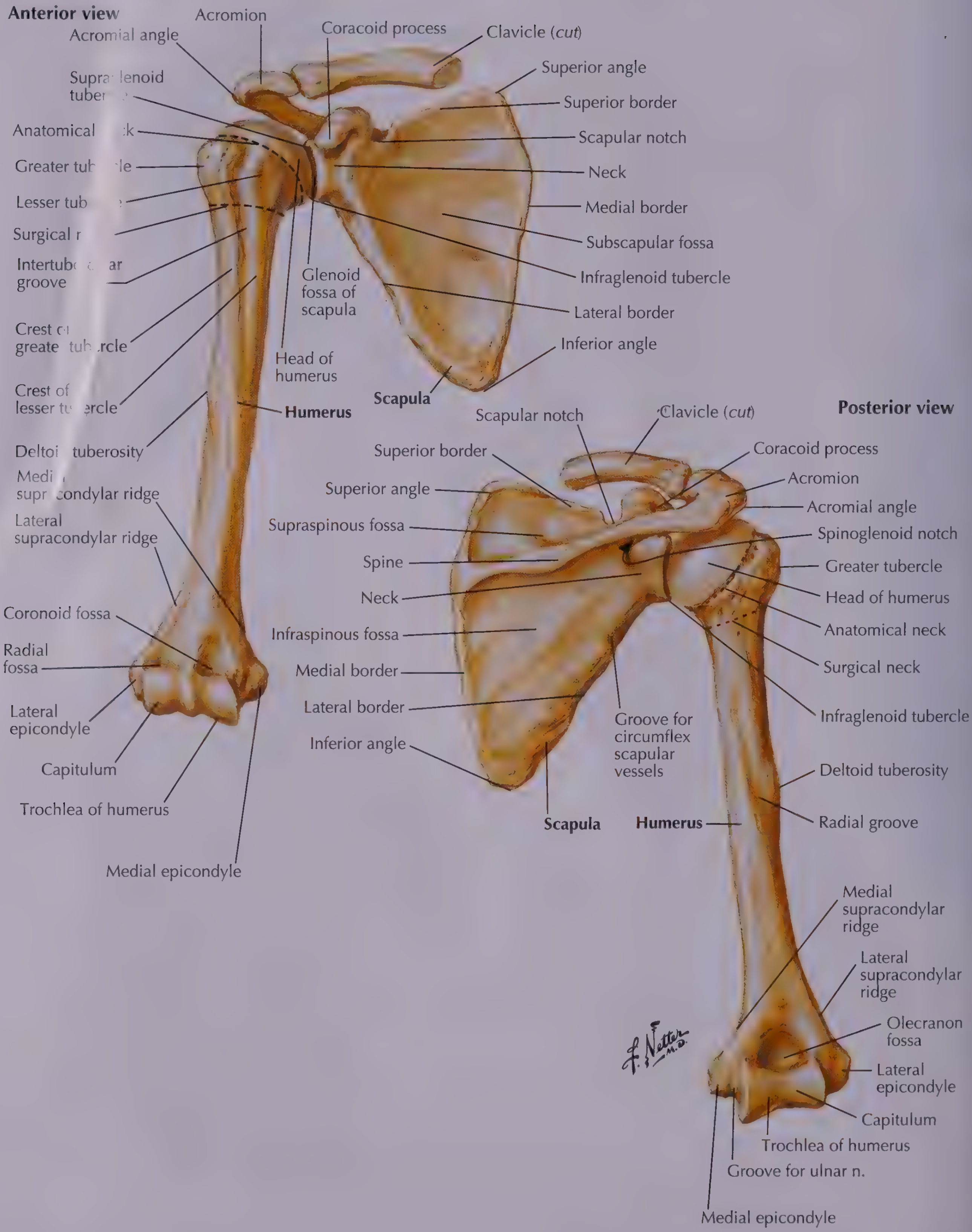
See also Plates 208, 444, 478


Infraclavicular node
Lateral axillary nodes
Cephalic v.
Basilic v.
Supratrochlear nodes
Median cubital v.
Cephalic v.
Basilic v.
Lymph vessels passing to dorsum of hand
Lymph vessels passing to dorsum of hand
Lymph vessels passing around interdigital space to dorsum of hand
Lymph vessels passing to dorsum of fingers

Note: Arrows indicate direction of drainage.

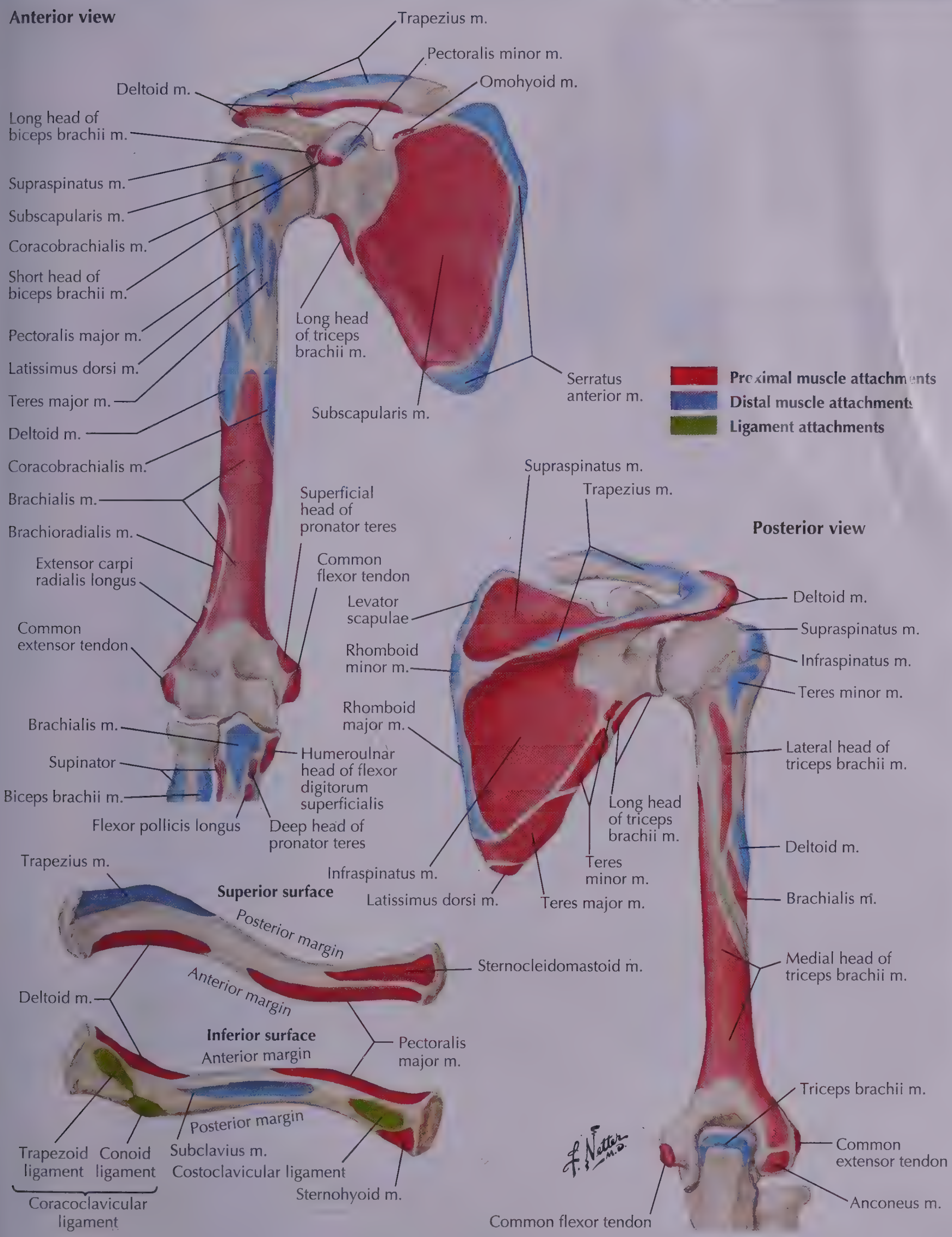
Humerus and Scapula

See also Plates 203, 427, 428, 430


Anterior view
Acromial angle
Acromion
Coracoid process
Clavicle (*cut*)
Superior angle
Superior border
Supraglenoid tubercle
Anatomical neck
Scapular notch
Greater tubercle
Neck
Lesser tubercle
Medial border
Surgical neck
Subscapular fossa
Intertubercular groove
Infraglenoid tubercle
Glenoid fossa of scapula
Lateral border
Crest of greater tubercle
Inferior angle
Head of humerus
Crest of lesser tubercle
Humerus
Scapula
Deltoid tuberosity
Medial supracondylar ridge
Lateral supracondylar ridge
Coronoid fossa
Radial fossa
Lateral epicondyle
Capitulum
Trochlea of humerus
Medial epicondyle
Posterior view
Scapular notch
Clavicle (*cut*)
Superior border
Coracoid process
Acromion
Superior angle
Acromial angle
Supraspinous fossa
Spinoglenoid notch
Spine
Greater tubercle
Neck
Head of humerus
Anatomical neck
Infraspinous fossa
Surgical neck
Medial border
Lateral border
Infraglenoid tubercle
Groove for circumflex scapular vessels
Inferior angle
Deltoid tuberosity
Scapula
Humerus
Radial groove
Medial supracondylar ridge
Lateral supracondylar ridge
Olecranon fossa
Lateral epicondyle
Capitulum
Trochlea of humerus
Groove for ulnar n.
Medial epicondyle
F. Netter M.D.

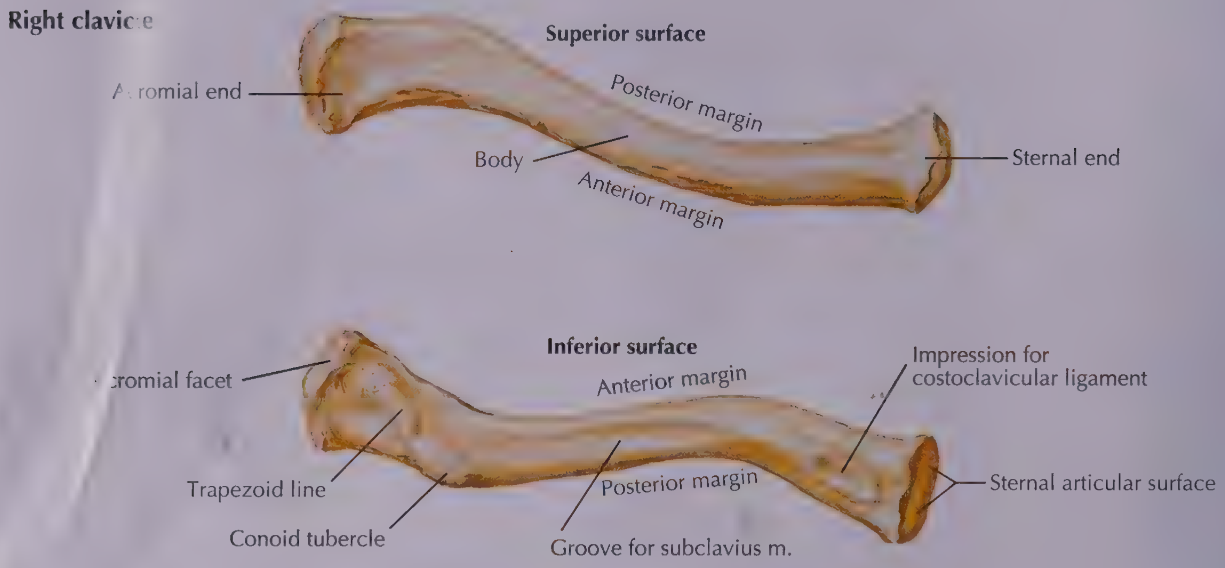
Muscle Attachment Sites of Humerus, Scapula, and Clavicle

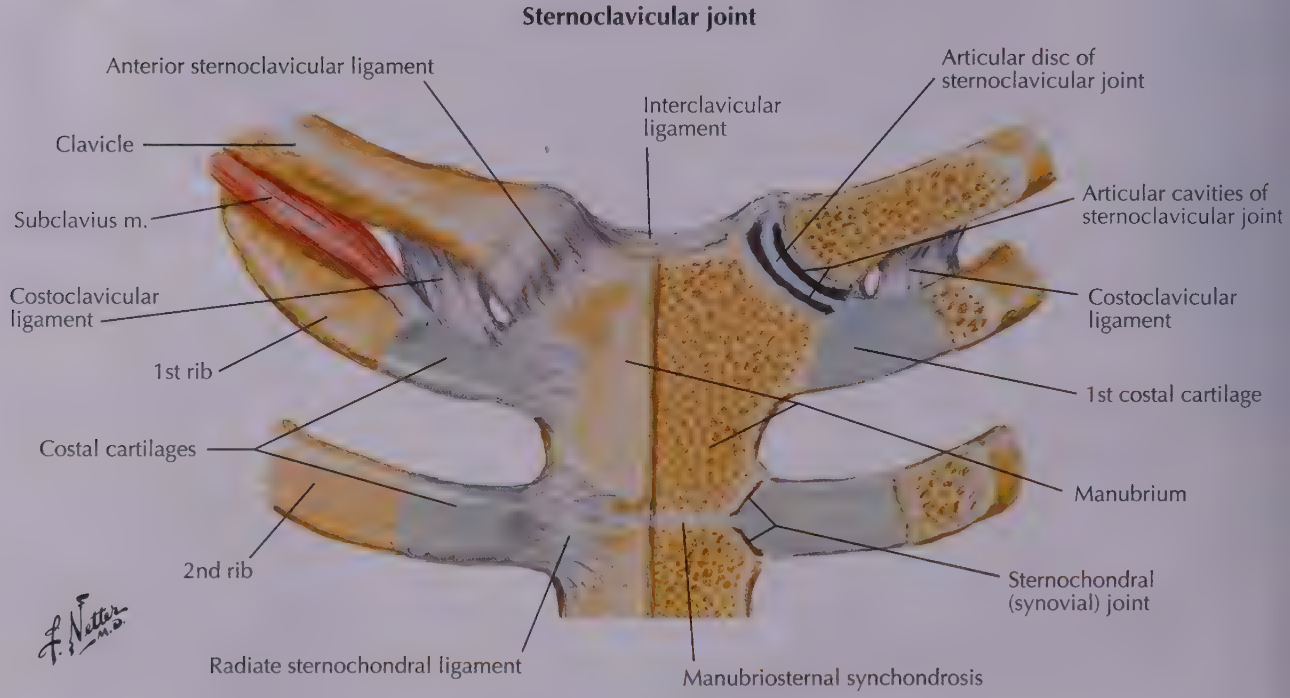
See also Plates 203, 427, 429


Anterior view
Trapezius m.
Pectoralis minor m.
Omohyoid m.
Deltoid m.
Long head of biceps brachii m.
Supraspinatus m.
Subscapularis m.
Coracobrachialis m.
Short head of biceps brachii m.
Pectoralis major m.
Latissimus dorsi m.
Teres major m.
Deltoid m.
Coracobrachialis m.
Brachialis m.
Brachioradialis m.
Extensor carpi radialis longus
Common extensor tendon
Long head of triceps brachii m.
Subscapularis m.
Serratus anterior m.
Superficial head of pronator teres
Common flexor tendon
Brachialis m.
Supinator
Biceps brachii m.
Humeroulnar head of flexor digitorum superficialis
Flexor pollicis longus
Deep head of pronator teres
🟥 Proximal muscle attachments
🟦 Distal muscle attachments
🟩 Ligament attachments
Supraspinatus m.
Trapezius m.
Posterior view
Levator scapulae
Deltoid m.
Supraspinatus m.
Rhomboid minor m.
Infraspinatus m.
Teres minor m.
Rhomboid major m.
Lateral head of triceps brachii m.
Long head of triceps brachii m.
Teres minor m.
Infraspinatus m.
Latissimus dorsi m.
Teres major m.
Deltoid m.
Brachialis m.
Medial head of triceps brachii m.
Triceps brachii m.
Common extensor tendon
Anconeus m.
Common flexor tendon
Trapezius m.
Superior surface
Posterior margin
Anterior margin
Sternocleidomastoid m.
Deltoid m.
Inferior surface
Anterior margin
Pectoralis major m.
Posterior margin
Trapezoid ligament
Conoid ligament
Coracoclavicular ligament
Subclavius m.
Costoclavicular ligament
Sternohyoid m.
F. Netter M.D.

Clavicle and Sternoclavicular Joint

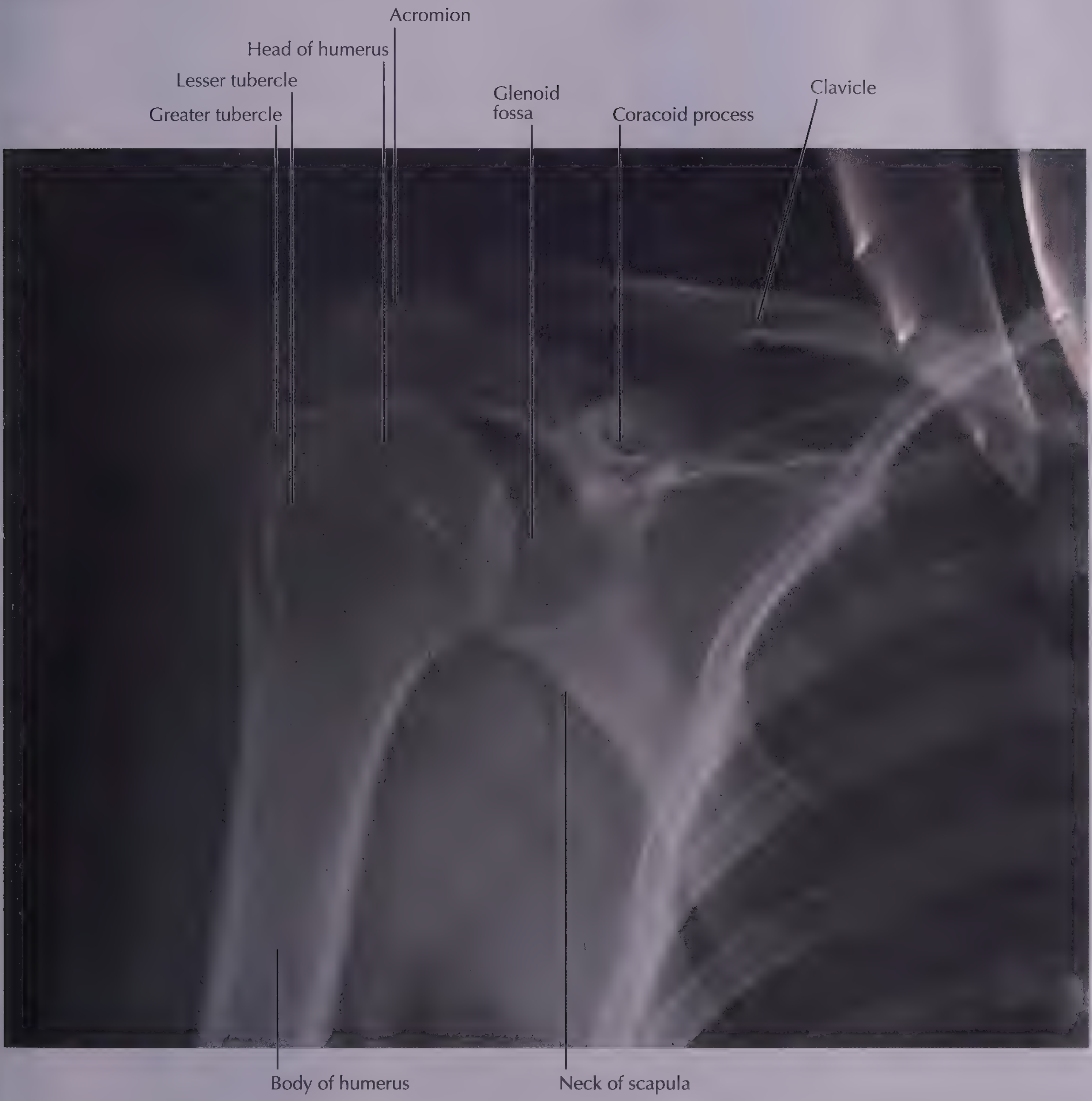
See also Plates 203, 210, 427, 428


Right clavicle
Superior surface
Acromial end
Posterior margin
Body
Anterior margin
Sternal end
Inferior surface
Acromial facet
Anterior margin
Impression for costoclavicular ligament
Trapezoid line
Sternal articular surface
Posterior margin
Conoid tubercle
Groove for subclavius m.


Sternoclavicular joint
Anterior sternoclavicular ligament
Articular disc of sternoclavicular joint
Interclavicular ligament
Clavicle
Subclavius m.
Articular cavities of sternoclavicular joint
Costoclavicular ligament
Costoclavicular ligament
1st rib
1st costal cartilage
Costal cartilages
Manubrium
2nd rib
Sternochondral (synovial) joint
F. Netter M.D.
Radiate sternochondral ligament
Manubriosternal synchondrosis

See also Plates 427, 428, 431

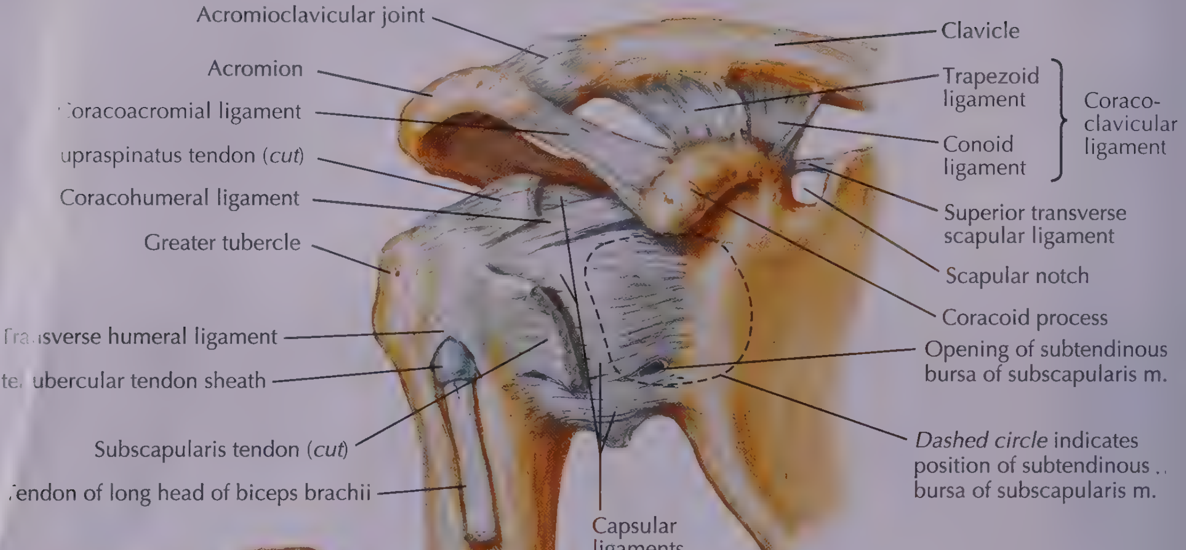
Anteroposterior radiograph of right shoulder


Acromion
Head of humerus
Lesser tubercle
Greater tubercle
Glenoid fossa
Coracoid process
Clavicle
Body of humerus
Neck of scapula

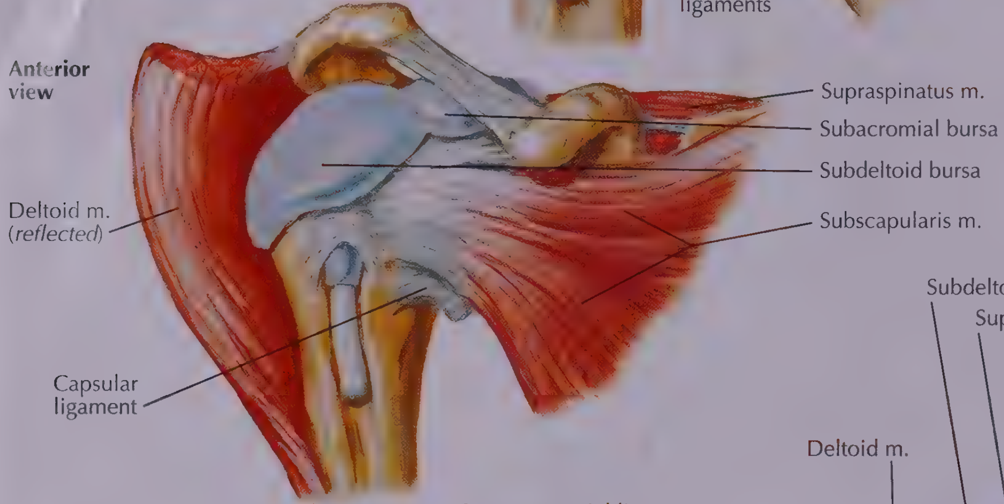
Joints of Shoulder

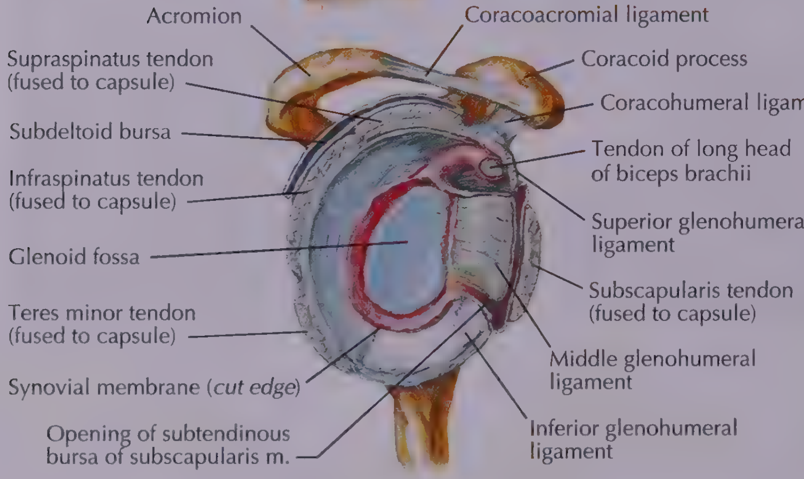
See also Plates 434, 440, 441

Anterior view

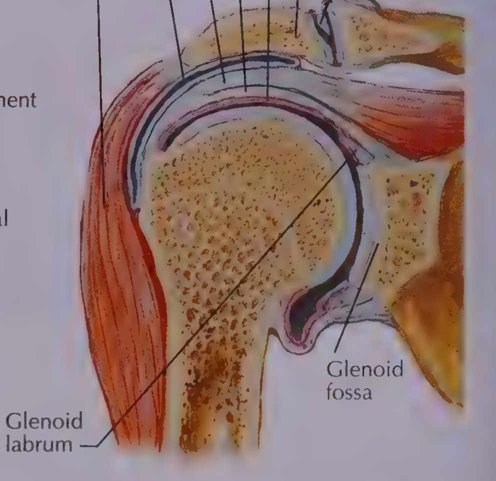

Acromioclavicular joint
Acromion
Coracoacromial ligament
Supraspinatus tendon (*cut*)
Coracohumeral ligament
Greater tubercle
Transverse humeral ligament
Intertubercular tendon sheath
Subscapularis tendon (*cut*)
Tendon of long head of biceps brachii
Capsular ligaments
Clavicle
Trapezoid ligament
Conoid ligament
Coraco-clavicular ligament
Superior transverse scapular ligament
Scapular notch
Coracoid process
Opening of subtendinous bursa of subscapularis m.
Dashed circle indicates position of subtendinous bursa of subscapularis m.
F. Netter M.D.

Anterior view


Supraspinatus m.
Subacromial bursa
Subdeltoid bursa
Subscapularis m.
Deltoid m. (*reflected*)
Capsular ligament

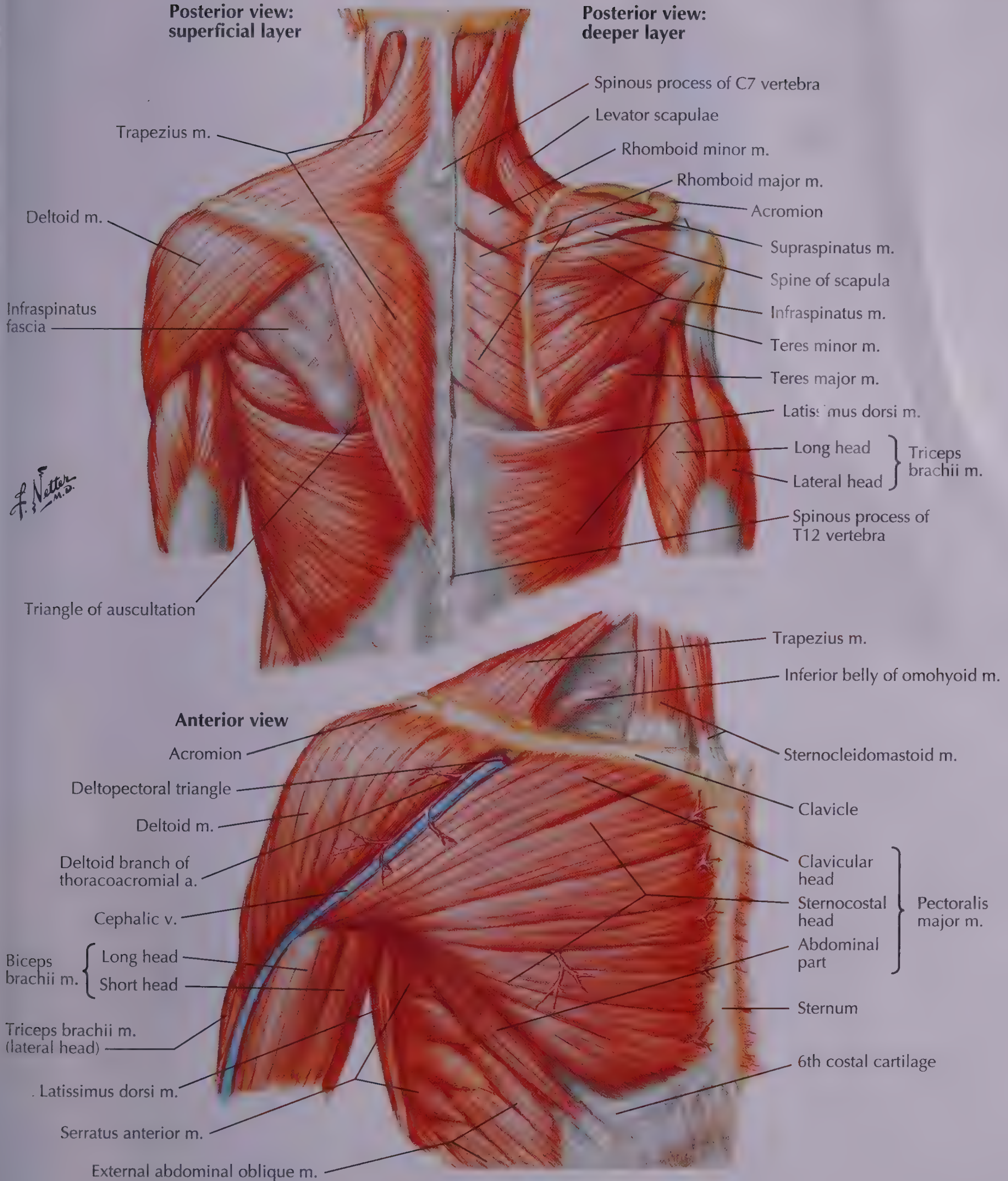

Acromion
Supraspinatus tendon (fused to capsule)
Subdeltoid bursa
Infraspinatus tendon (fused to capsule)
Glenoid fossa
Teres minor tendon (fused to capsule)
Synovial membrane (*cut edge*)
Opening of subtendinous bursa of subscapularis m.
Coracoacromial ligament
Coracoid process
Coracohumeral ligament
Tendon of long head of biceps brachii
Superior glenohumeral ligament
Subscapularis tendon (fused to capsule)
Middle glenohumeral ligament
Inferior glenohumeral ligament

Joint opened: lateral view


Subdeltoid bursa
Supraspinatus tendon
Capsular ligament
Synovial membrane
Acromion
Acromio-clavicular joint
Deltoid m.
Glenoid fossa
Glenoid labrum

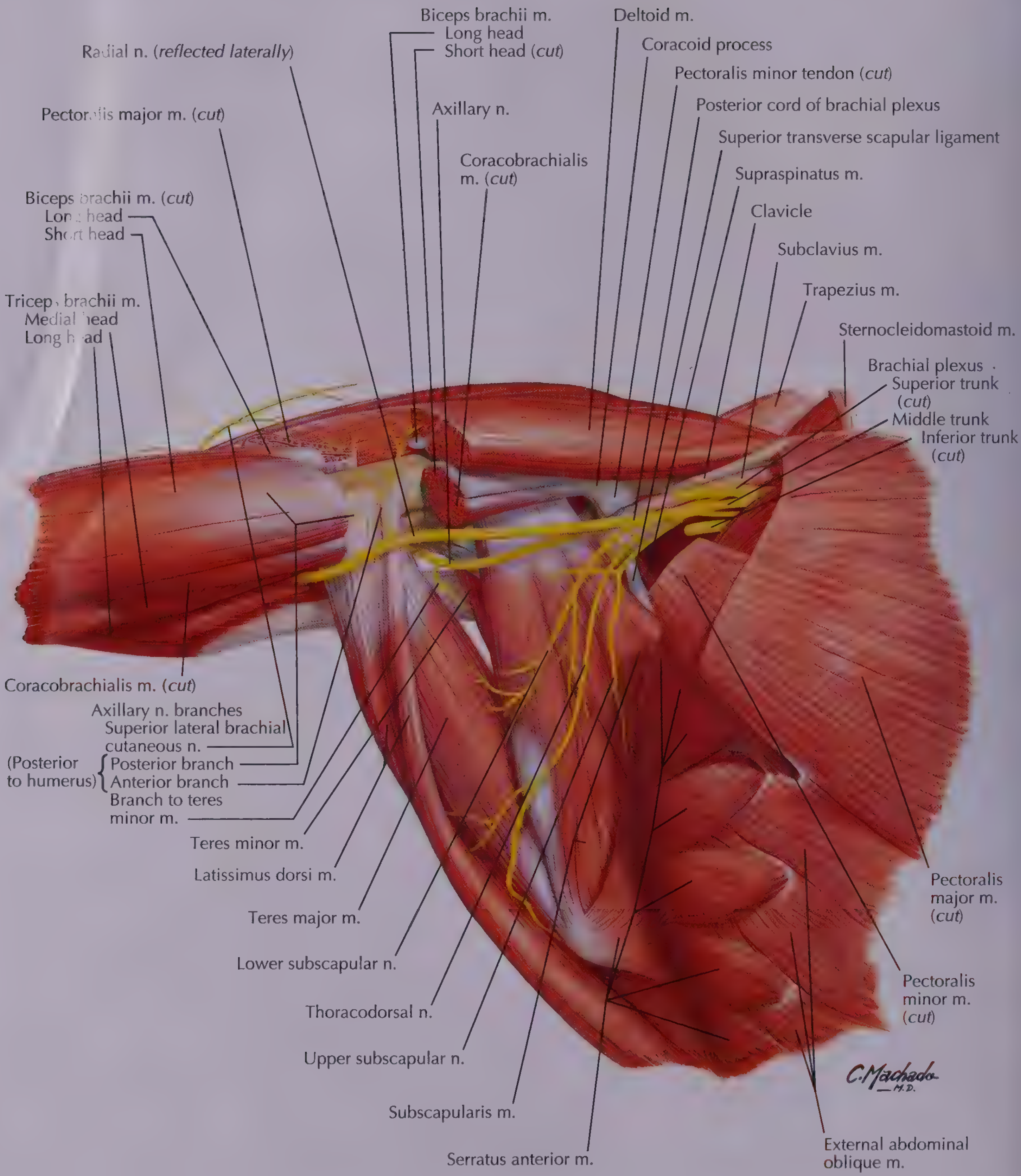
Coronal section through shoulder girdle

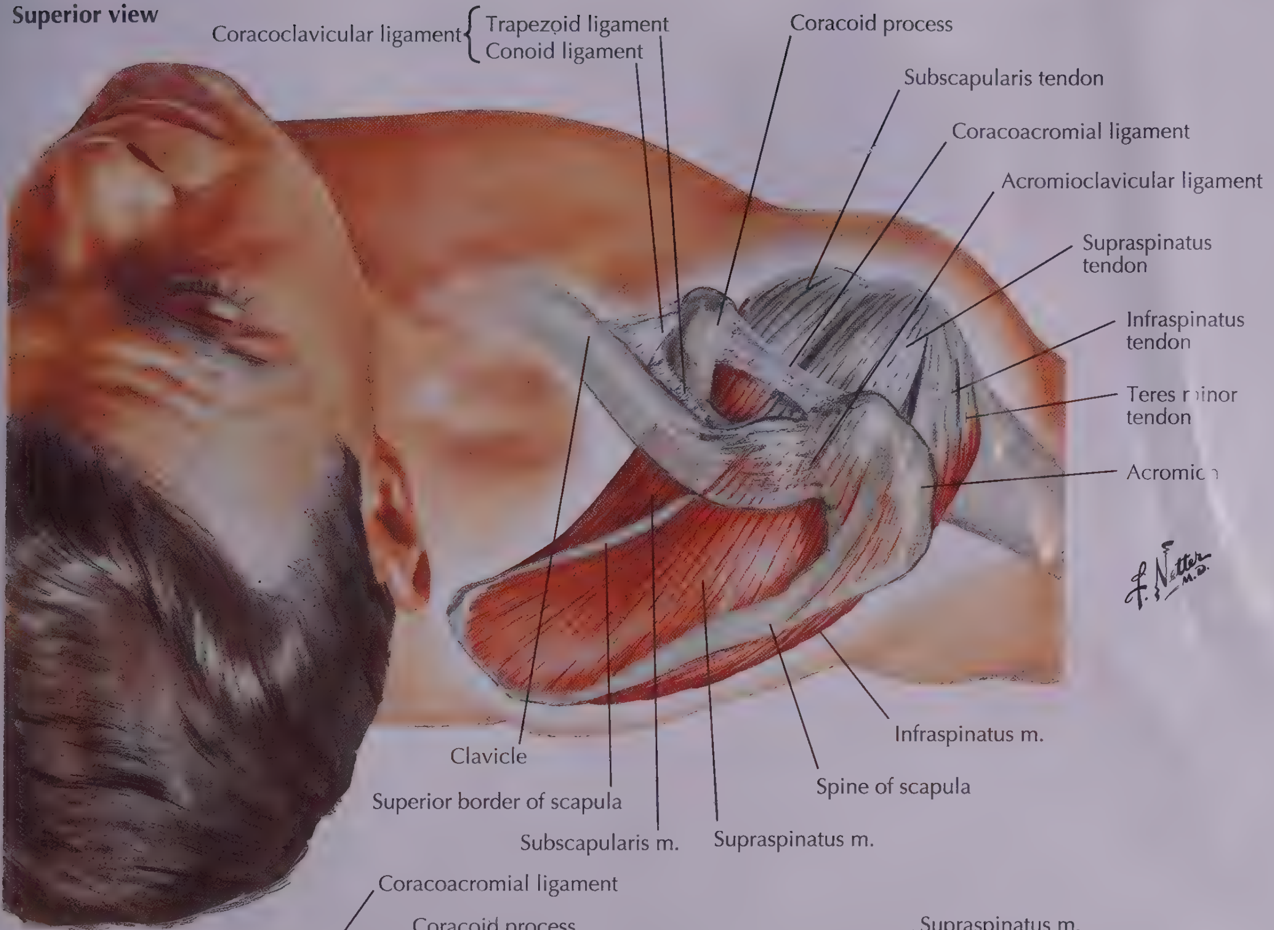
See also Plates 195, 209


Posterior view: superficial layer
Posterior view: deeper layer
Trapezius m.
Deltoid m.
Infraspinatus fascia
Triangle of auscultation
Spinous process of C7 vertebra
Levator scapulae
Rhomboid minor m.
Rhomboid major m.
Acromion
Supraspinatus m.
Spine of scapula
Infraspinatus m.
Teres minor m.
Teres major m.
Latissimus dorsi m.
Long head
Lateral head
Triceps brachii m.
Spinous process of T12 vertebra
Anterior view
Acromion
Deltopectoral triangle
Deltoid m.
Deltoid branch of thoracoacromial a.
Cephalic v.
Biceps brachii m.
Long head
Short head
Triceps brachii m. (lateral head)
Latissimus dorsi m.
Serratus anterior m.
External abdominal oblique m.
Trapezius m.
Inferior belly of omohyoid m.
Sternocleidomastoid m.
Clavicle
Clavicular head
Sternocostal head
Abdominal part
Pectoralis major m.
Sternum
6th costal cartilage

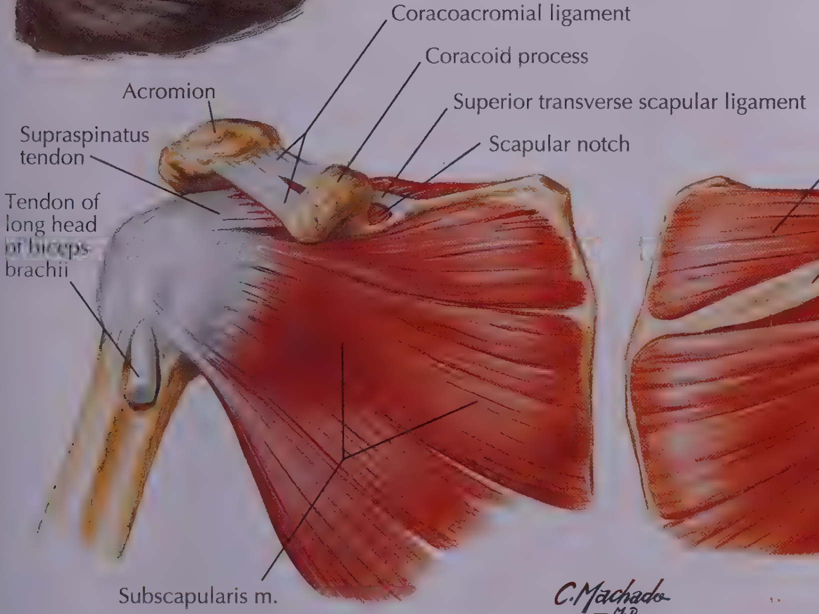
Axilla: Posterior Wall

See also Plates 438, 439

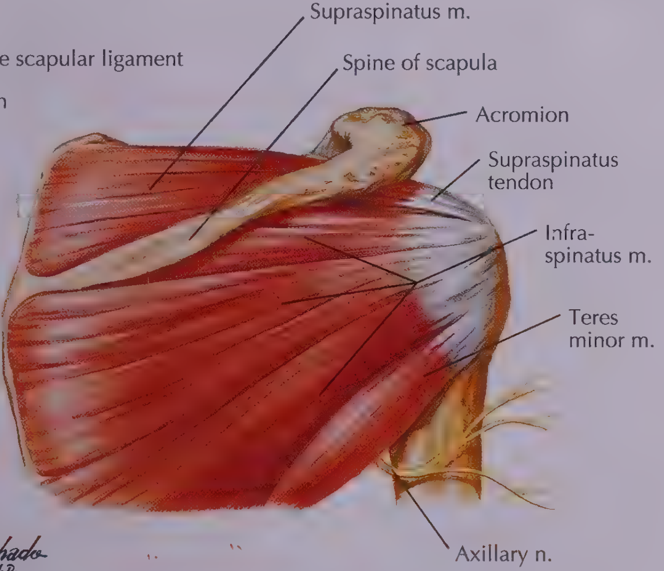

Radial n. (*reflected laterally*)
Pectoralis major m. (*cut*)
Biceps brachii m. (*cut*)
Long head
Short head
Triceps brachii m.
Medial head
Long head
Biceps brachii m.
Long head
Short head (*cut*)
Axillary n.
Coracobrachialis m. (*cut*)
Deltoid m.
Coracoid process
Pectoralis minor tendon (*cut*)
Posterior cord of brachial plexus
Superior transverse scapular ligament
Supraspinatus m.
Clavicle
Subclavius m.
Trapezius m.
Sternocleidomastoid m.
Brachial plexus
Superior trunk (*cut*)
Middle trunk
Inferior trunk (*cut*)
Coracobrachialis m. (*cut*)
Axillary n. branches
Superior lateral brachial cutaneous n.
(Posterior to humerus)
Posterior branch
Anterior branch
Branch to teres minor m.
Teres minor m.
Latissimus dorsi m.
Teres major m.
Lower subscapular n.
Thoracodorsal n.
Upper subscapular n.
Subscapularis m.
Serratus anterior m.
Pectoralis major m. (*cut*)
Pectoralis minor m. (*cut*)
External abdominal oblique m.
C. Machado M.D.


Coracoclavicular ligament
Trapezoid ligament
Conoid ligament
Coracoid process
Subscapularis tendon
Coracoacromial ligament
Acromioclavicular ligament
Supraspinatus tendon
Infraspinatus tendon
Teres minor tendon
Acromion
F. Netter M.D.
Infraspinatus m.
Clavicle
Spine of scapula
Superior border of scapula
Subscapularis m.
Supraspinatus m.

Superior view


Coracoacromial ligament
Coracoid process
Acromion
Superior transverse scapular ligament
Supraspinatus tendon
Scapular notch
Tendon of long head of biceps brachii
Subscapularis m.
C. Machado M.D.

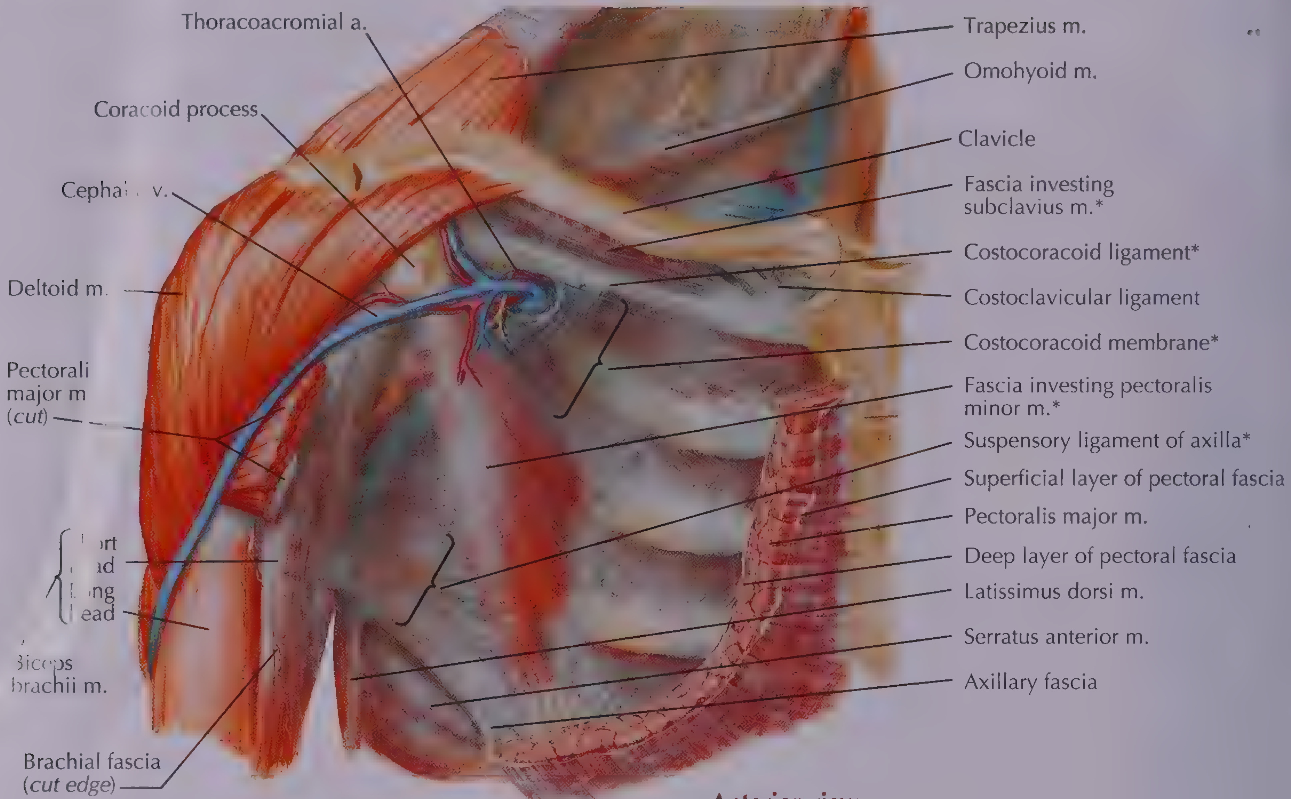
Anterior view


Supraspinatus m.
Spine of scapula
Acromion
Supraspinatus tendon
Infra-spinatus m.
Teres minor m.
Axillary n.

Posterior view

Pectoral, Clavipectoral, and Axillary Fasciae

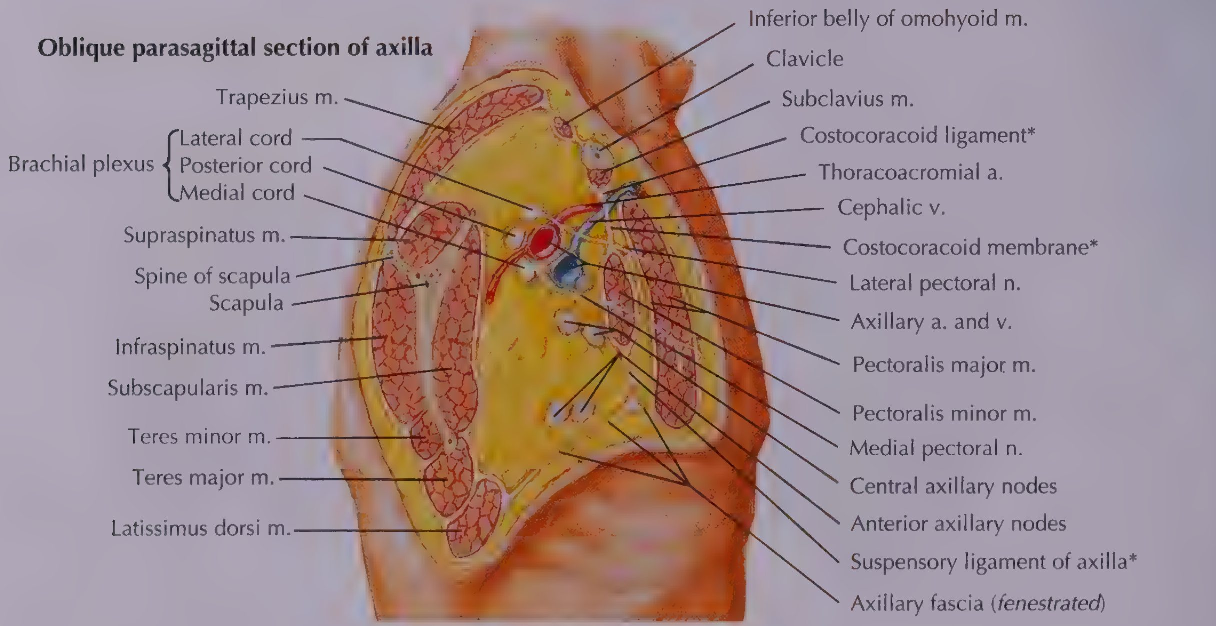
See also Plates 207, 209


Thoracoacromial a.
Coracoid process
Cephalic v.
Deltoid m.
Pectoralis major m. (*cut*)
Short head
Long head
Biceps brachii m.
Brachial fascia (*cut edge*)
Trapezius m.
Omohyoid m.
Clavicle
Fascia investing subclavius m.*
Costocoracoid ligament*
Costoclavicular ligament
Costocoracoid membrane*
Fascia investing pectoralis minor m.*
Suspensory ligament of axilla*
Superficial layer of pectoral fascia
Pectoralis major m.
Deep layer of pectoral fascia
Latissimus dorsi m.
Serratus anterior m.
Axillary fascia

Anterior view

F. Netter M.D.

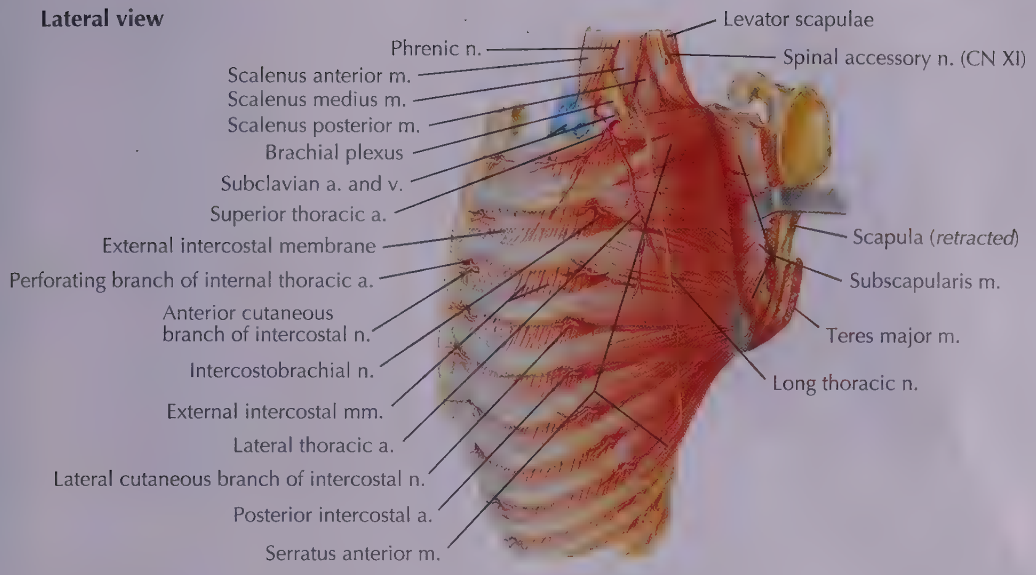
Oblique parasagittal section of axilla


Trapezius m.
Brachial plexus
Lateral cord
Posterior cord
Medial cord
Supraspinatus m.
Spine of scapula
Scapula
Infraspinatus m.
Subscapularis m.
Teres minor m.
Teres major m.
Latissimus dorsi m.
Inferior belly of omohyoid m.
Clavicle
Subclavius m.
Costocoracoid ligament*
Thoracoacromial a.
Cephalic v.
Costocoracoid membrane*
Lateral pectoral n.
Axillary a. and v.
Pectoralis major m.
Pectoralis minor m.
Medial pectoral n.
Central axillary nodes
Anterior axillary nodes
Suspensory ligament of axilla*
Axillary fascia (*fenestrated*)

*Components of clavipectoral fascia

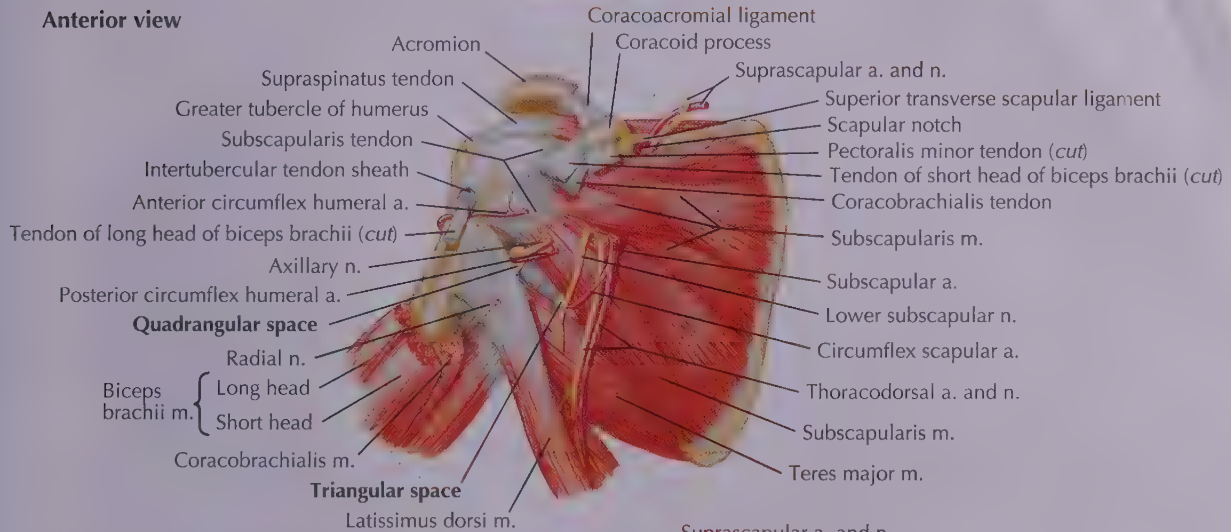
Shoulder Region

See also Plates 438, 488



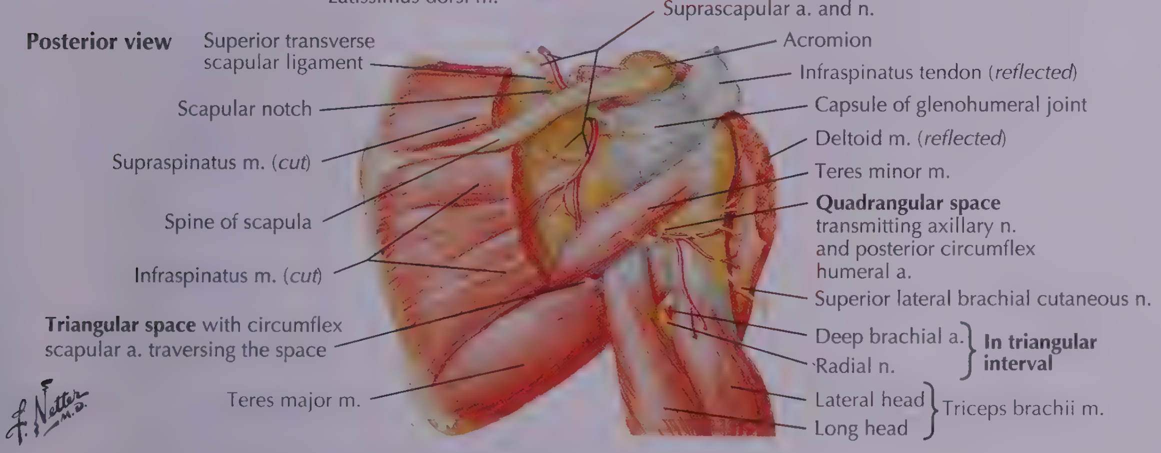
Lateral view

Levator scapulae
Phrenic n.
Spinal accessory n. (CN XI)
Scalenus anterior m.
Scalenus medius m.
Scalenus posterior m.
Brachial plexus
Subclavian a. and v.
Superior thoracic a.
External intercostal membrane
Scapula (*retracted*)
Perforating branch of internal thoracic a.
Subscapularis m.
Anterior cutaneous branch of intercostal n.
Teres major m.
Intercostobrachial n.
Long thoracic n.
External intercostal mm.
Lateral thoracic a.
Lateral cutaneous branch of intercostal n.
Posterior intercostal a.
Serratus anterior m.



Anterior view

Coracoacromial ligament
Coracoid process
Acromion
Suprascapular a. and n.
Supraspinatus tendon
Superior transverse scapular ligament
Greater tubercle of humerus
Scapular notch
Subscapularis tendon
Pectoralis minor tendon (*cut*)
Intertubercular tendon sheath
Tendon of short head of biceps brachii (*cut*)
Anterior circumflex humeral a.
Coracobrachialis tendon
Tendon of long head of biceps brachii (*cut*)
Subscapularis m.
Axillary n.
Subscapular a.
Posterior circumflex humeral a.
Lower subscapular n.
Quadrangular space
Circumflex scapular a.
Radial n.
Biceps brachii m. Long head
Short head
Thoracodorsal a. and n.
Subscapularis m.
Coracobrachialis m.
Teres major m.
Triangular space
Latissimus dorsi m.

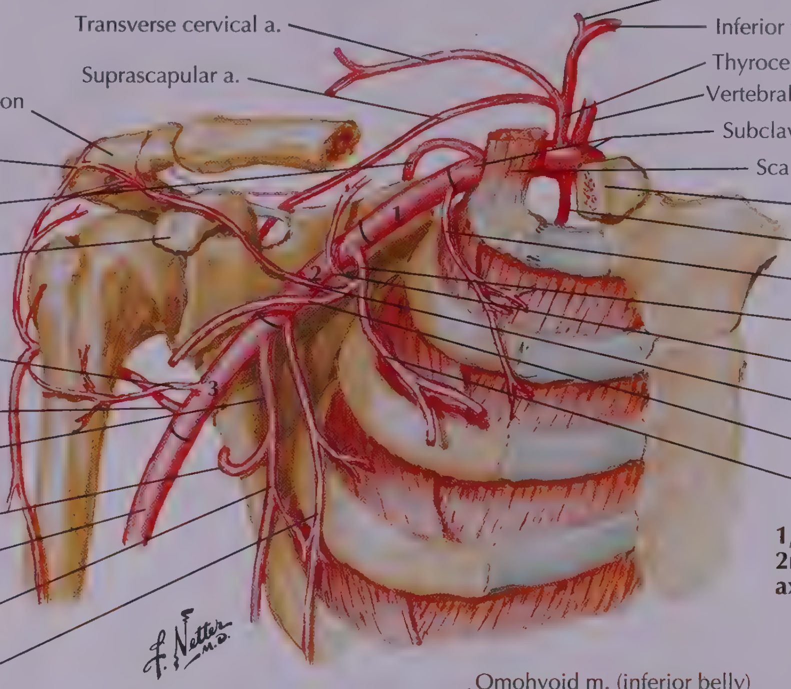


Posterior view

Suprascapular a. and n.
Superior transverse scapular ligament
Acromion
Infraspinatus tendon (*reflected*)
Scapular notch
Capsule of glenohumeral joint
Supraspinatus m. (*cut*)
Deltoid m. (*reflected*)
Teres minor m.
Spine of scapula
Quadrangular space transmitting axillary n. and posterior circumflex humeral a.
Infraspinatus m. (*cut*)
Superior lateral brachial cutaneous n.
Triangular space with circumflex scapular a. traversing the space
Deep brachial a.
Radial n.
In triangular interval
Teres major m.
Lateral head
Long head
Triceps brachii m.
F. Netter M.D.

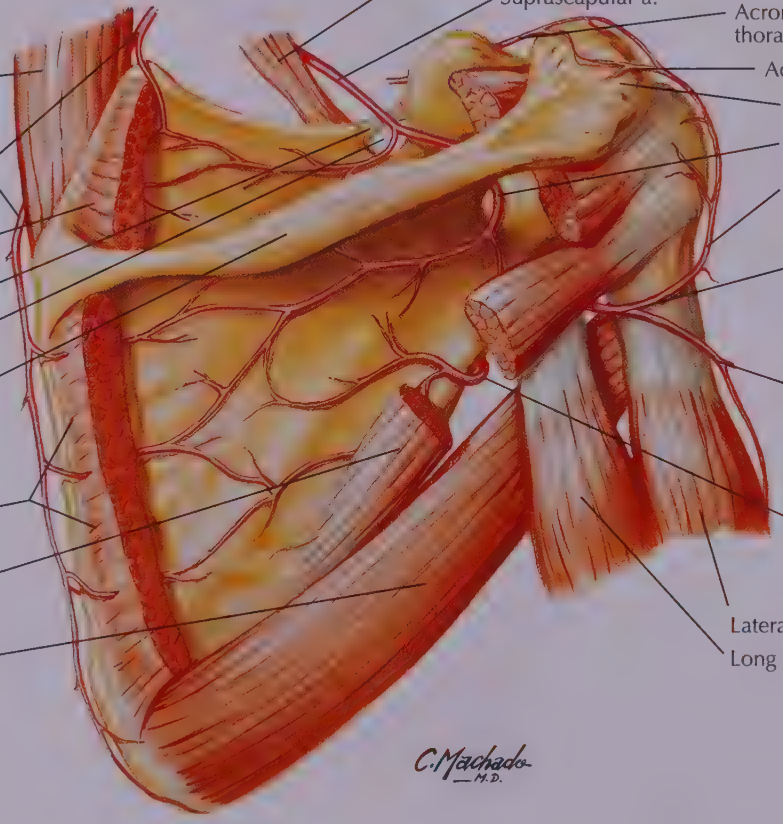
See also Plates 57, 443, BP 24

Anterior view


Transverse cervical a.
Suprascapular a.
Acromion
Acromial anastomosis
Dorsal scapular a.
Coracoid process
Anterior circumflex humeral
Posterior circumflex humeral a.
Subscapular a.
Circumflex scapular a.
Brachial a.
Thoracodorsal a.
Lateral thoracic a.
Ascending cervical a.
Inferior thyroid a.
Thyrocervical trunk
Vertebral a.
Subclavian a.
Scalenus anterior m.
Clavicle (*cut*)
Internal thoracic a.
Superior thoracic a.
Thoracoacromial a.
Clavicular branch
Acromial branch
Deltoid branch
Pectoral branch
1
2
3
F. Netter M.D.

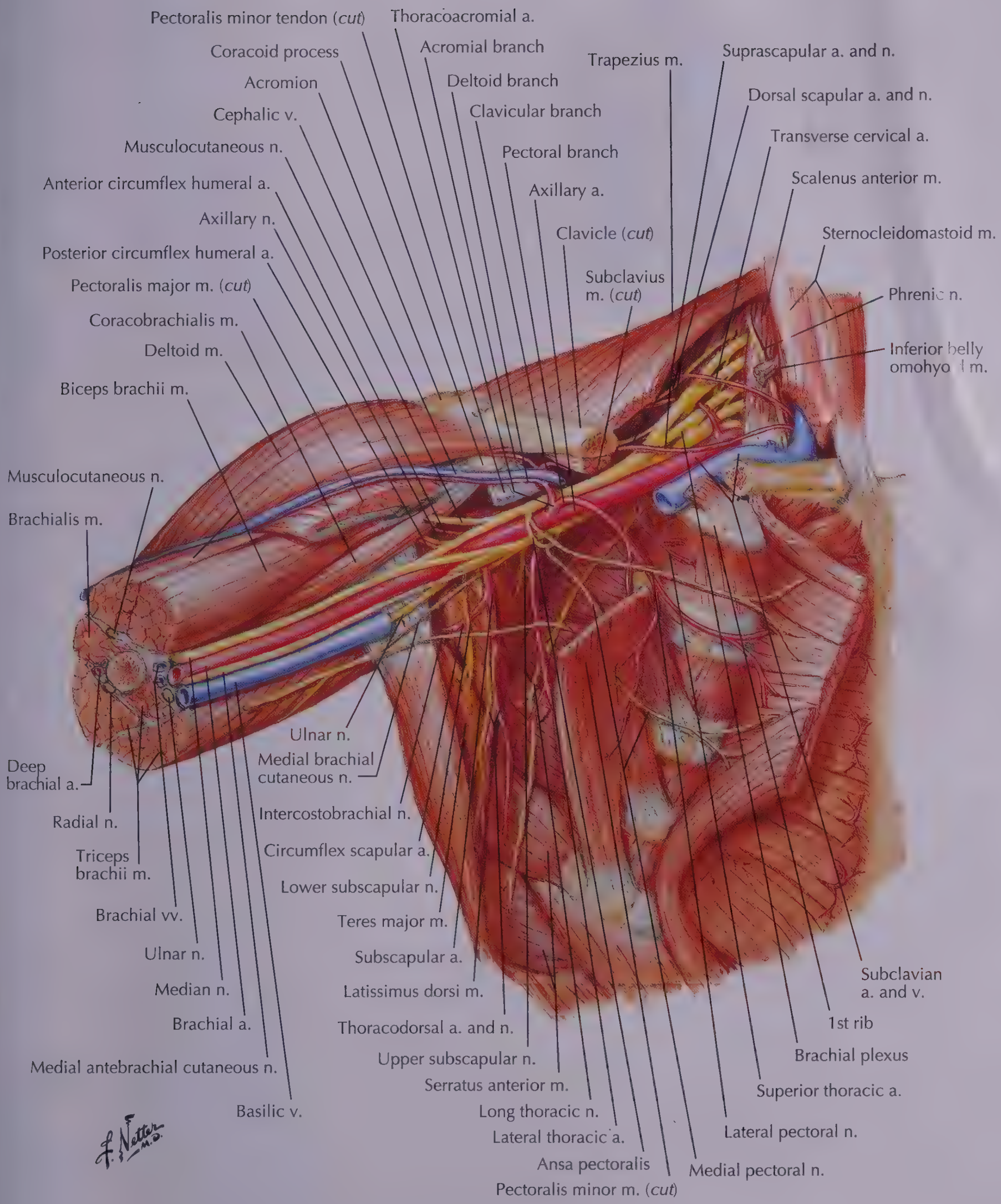
1, 2, 3 indicate 1st, 2nd, and 3rd parts of axillary artery

Posterior view


Omohyoid m. (inferior belly)
Suprascapular a.
Levator scapulae
Dorsal scapular a.
Supraspinatus m. (*cut*)
Superior transverse scapular ligament
Scapular notch
Spine of scapula
Infraspinatus m. (*cut*)
Teres minor m. (*cut*)
Teres major m.
Acromial branch of thoracoacromial a.
Acromial anastomosis
Acromion
Suprascapular a.
Ascending branch of posterior circumflex humeral a.
Posterior circumflex humeral a. (in quadrangular space)
Descending branch of posterior circumflex humeral a.
Circumflex scapular a.
Lateral head
Long head
Triceps brachii m.
C. Machado M.D.

Axilla: Anterior View

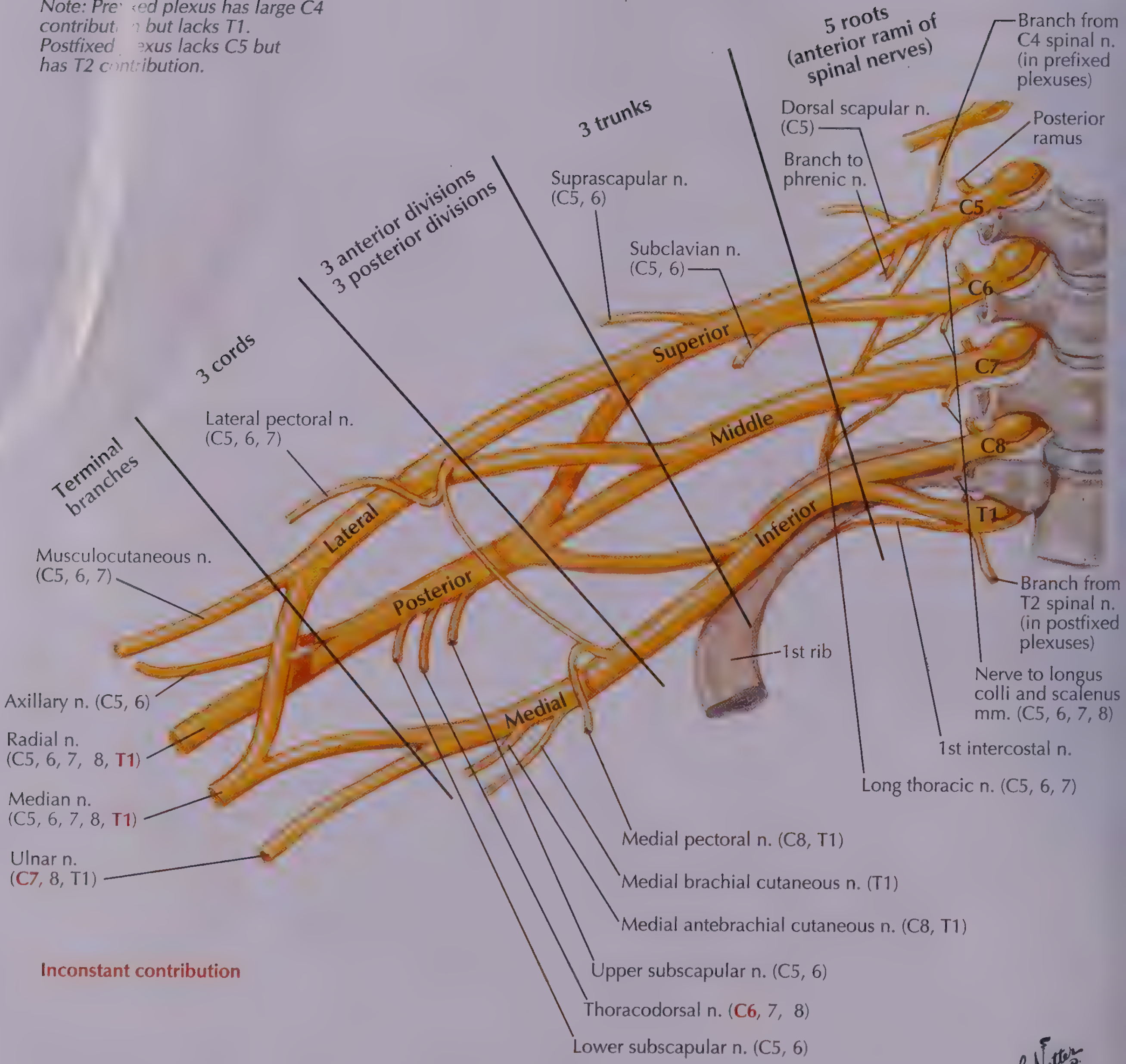
See also Plates 433, 436, BP 41


Pectoralis minor tendon (*cut*)
Thoracoacromial a.
Coracoid process
Acromial branch
Acromion
Deltoid branch
Trapezius m.
Suprascapular a. and n.
Cephalic v.
Clavicular branch
Dorsal scapular a. and n.
Musculocutaneous n.
Pectoral branch
Transverse cervical a.
Anterior circumflex humeral a.
Axillary a.
Scalenus anterior m.
Axillary n.
Clavicle (*cut*)
Sternocleidomastoid m.
Posterior circumflex humeral a.
Subclavius m. (*cut*)
Pectoralis major m. (*cut*)
Phrenic n.
Coracobrachialis m.
Inferior belly omohyoid m.
Deltoid m.
Biceps brachii m.
Musculocutaneous n.
Brachialis m.
Ulnar n.
Medial brachial cutaneous n.
Deep brachial a.
Radial n.
Intercostobrachial n.
Triceps brachii m.
Circumflex scapular a.
Lower subscapular n.
Brachial vv.
Teres major m.
Ulnar n.
Subscapular a.
Subclavian a. and v.
Median n.
Latissimus dorsi m.
1st rib
Brachial a.
Thoracodorsal a. and n.
Brachial plexus
Upper subscapular n.
Medial antebrachial cutaneous n.
Serratus anterior m.
Superior thoracic a.
Basilic v.
Long thoracic n.
Lateral pectoral n.
Lateral thoracic a.
Ansa pectoralis
Medial pectoral n.
Pectoralis minor m. (*cut*)

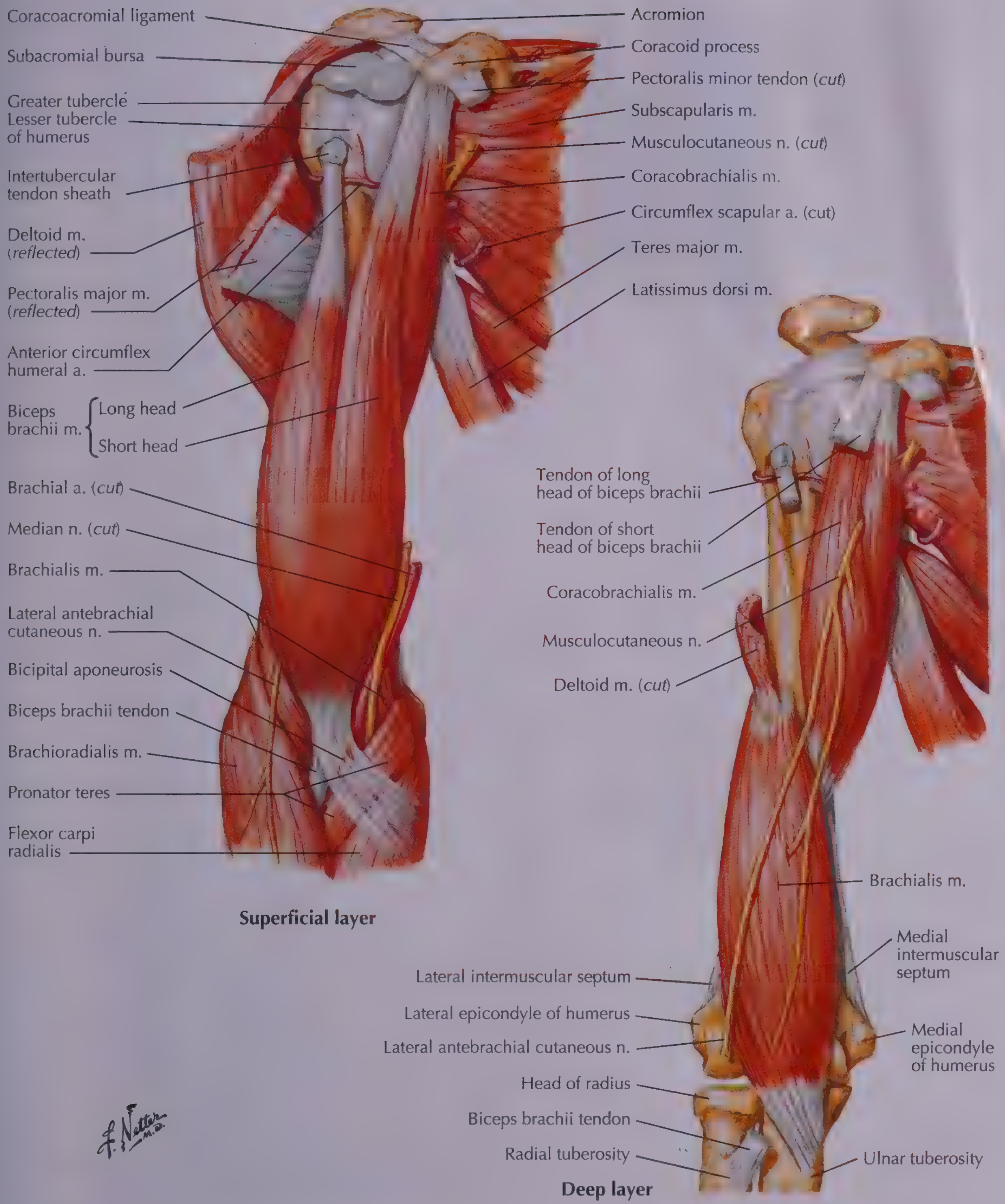
Brachial Plexus: Schema

See also Plates 483, 484

Note: Prefixed plexus has large C4 contribution but lacks T1. Postfixed plexus lacks C5 but has T2 contribution.


5 roots (anterior rami of spinal nerves)
3 trunks
3 anterior divisions
3 posterior divisions
3 cords
Terminal branches
Branch from C4 spinal n. (in prefixed plexuses)
Posterior ramus
Dorsal scapular n. (C5)
Branch to phrenic n.
Suprascapular n. (C5, 6)
Subclavian n. (C5, 6)
C5
C6
C7
C8
T1
Superior
Middle
Inferior
Lateral
Posterior
Medial
Lateral pectoral n. (C5, 6, 7)
Musculocutaneous n. (C5, 6, 7)
Axillary n. (C5, 6)
Radial n. (C5, 6, 7, 8, T1)
Median n. (C5, 6, 7, 8, T1)
Ulnar n. (C7, 8, T1)
1st rib
Branch from T2 spinal n. (in postfixed plexuses)
Nerve to longus colli and scalenus mm. (C5, 6, 7, 8)
1st intercostal n.
Long thoracic n. (C5, 6, 7)
Medial pectoral n. (C8, T1)
Medial brachial cutaneous n. (T1)
Medial antebrachial cutaneous n. (C8, T1)
Upper subscapular n. (C5, 6)
Thoracodorsal n. (C6, 7, 8)
Lower subscapular n. (C5, 6)

Inconstant contribution

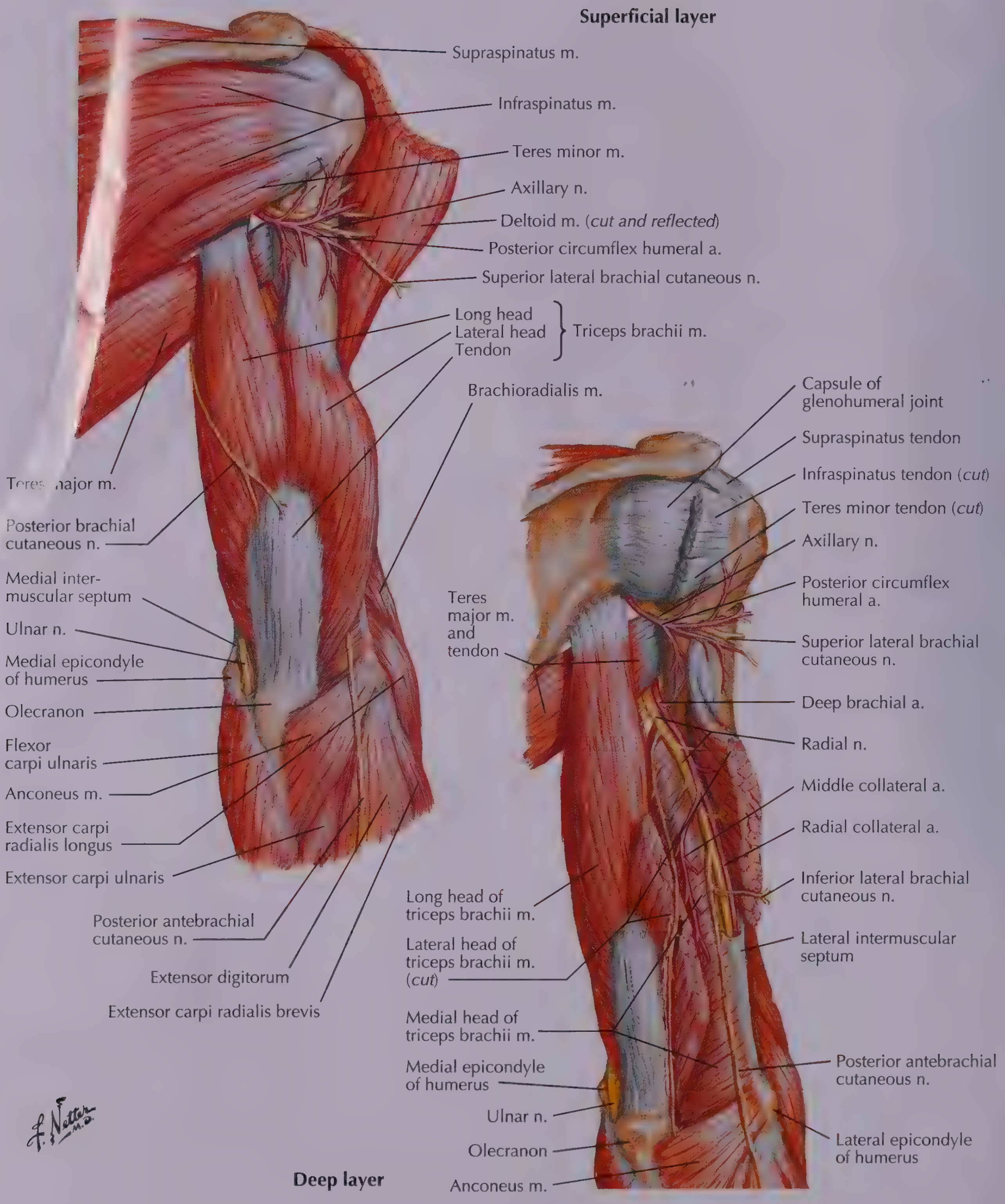

Coracoacromial ligament
Subacromial bursa
Greater tubercle
Lesser tubercle of humerus
Intertubercular tendon sheath
Deltoid m. (*reflected*)
Pectoralis major m. (*reflected*)
Anterior circumflex humeral a.
Biceps brachii m.
Long head
Short head
Brachial a. (*cut*)
Median n. (*cut*)
Brachialis m.
Lateral antebrachial cutaneous n.
Bicipital aponeurosis
Biceps brachii tendon
Brachioradialis m.
Pronator teres
Flexor carpi radialis
Acromion
Coracoid process
Pectoralis minor tendon (*cut*)
Subscapularis m.
Musculocutaneous n. (*cut*)
Coracobrachialis m.
Circumflex scapular a. (cut)
Teres major m.
Latissimus dorsi m.
Tendon of long head of biceps brachii
Tendon of short head of biceps brachii
Coracobrachialis m.
Musculocutaneous n.
Deltoid m. (*cut*)
Brachialis m.
Medial intermuscular septum
Lateral intermuscular septum
Lateral epicondyle of humerus
Lateral antebrachial cutaneous n.
Medial epicondyle of humerus
Head of radius
Biceps brachii tendon
Radial tuberosity
Ulnar tuberosity

Superficial layer

Deep layer

Muscles of Arm: Posterior Compartment

See also Plates 434, 488

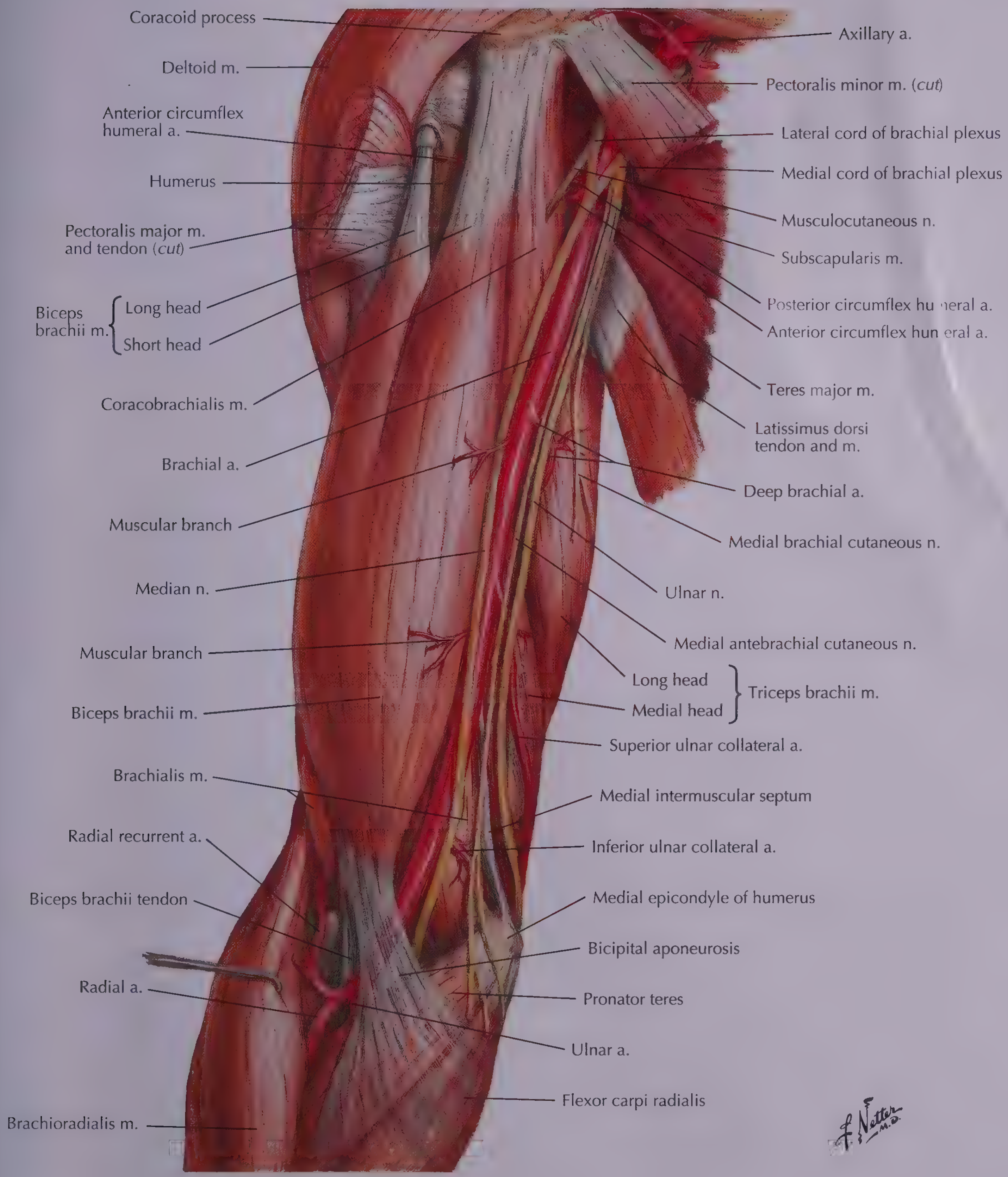


Superficial layer

Deep layer

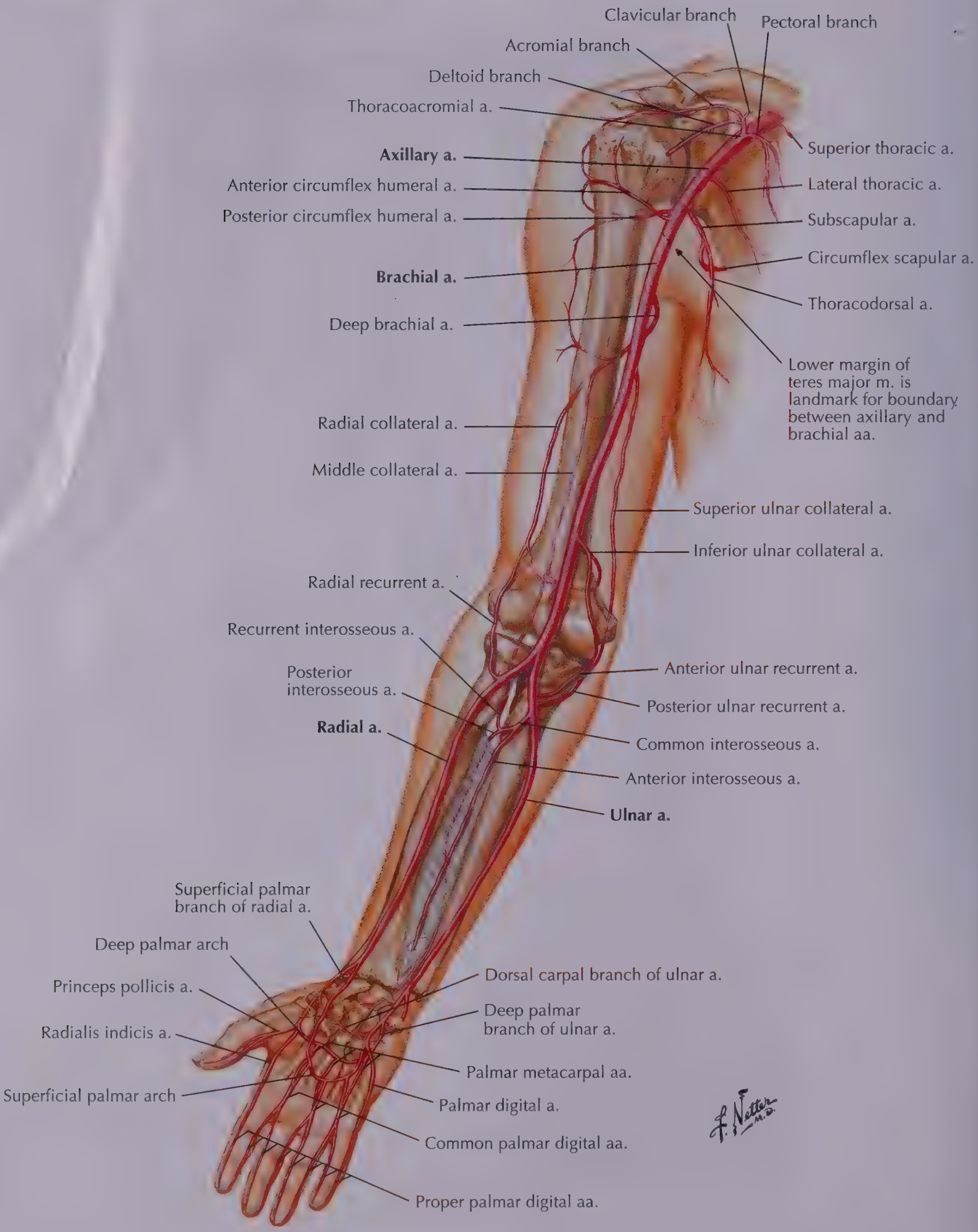
Supraspinatus m.
Infraspinatus m.
Teres minor m.
Axillary n.
Deltoid m. (*cut and reflected*)
Posterior circumflex humeral a.
Superior lateral brachial cutaneous n.
Long head
Lateral head
Tendon
Triceps brachii m.
Brachioradialis m.
Teres major m.
Posterior brachial cutaneous n.
Medial intermuscular septum
Ulnar n.
Medial epicondyle of humerus
Olecranon
Flexor carpi ulnaris
Anconeus m.
Extensor carpi radialis longus
Extensor carpi ulnaris
Posterior antebrachial cutaneous n.
Extensor digitorum
Extensor carpi radialis brevis
Capsule of glenohumeral joint
Supraspinatus tendon
Infraspinatus tendon (*cut*)
Teres minor tendon (*cut*)
Axillary n.
Posterior circumflex humeral a.
Superior lateral brachial cutaneous n.
Deep brachial a.
Radial n.
Middle collateral a.
Radial collateral a.
Inferior lateral brachial cutaneous n.
Lateral intermuscular septum
Posterior antebrachial cutaneous n.
Lateral epicondyle of humerus
Teres major m. and tendon
Long head of triceps brachii m.
Lateral head of triceps brachii m. (*cut*)
Medial head of triceps brachii m.
Medial epicondyle of humerus
Ulnar n.
Olecranon
Anconeus m.
F. Netter M.D.

Brachial Artery in Situ


Coracoid process
Deltoid m.
Anterior circumflex humeral a.
Humerus
Pectoralis major m. and tendon (*cut*)
Biceps brachii m.
Long head
Short head
Coracobrachialis m.
Brachial a.
Muscular branch
Median n.
Muscular branch
Biceps brachii m.
Brachialis m.
Radial recurrent a.
Biceps brachii tendon
Radial a.
Brachioradialis m.
Axillary a.
Pectoralis minor m. (*cut*)
Lateral cord of brachial plexus
Medial cord of brachial plexus
Musculocutaneous n.
Subscapularis m.
Posterior circumflex humeral a.
Anterior circumflex humeral a.
Teres major m.
Latissimus dorsi tendon and m.
Deep brachial a.
Medial brachial cutaneous n.
Ulnar n.
Medial antebrachial cutaneous n.
Long head
Medial head
Triceps brachii m.
Superior ulnar collateral a.
Medial intermuscular septum
Inferior ulnar collateral a.
Medial epicondyle of humerus
Bicipital aponeurosis
Pronator teres
Ulnar a.
Flexor carpi radialis
F. Netter M.D.

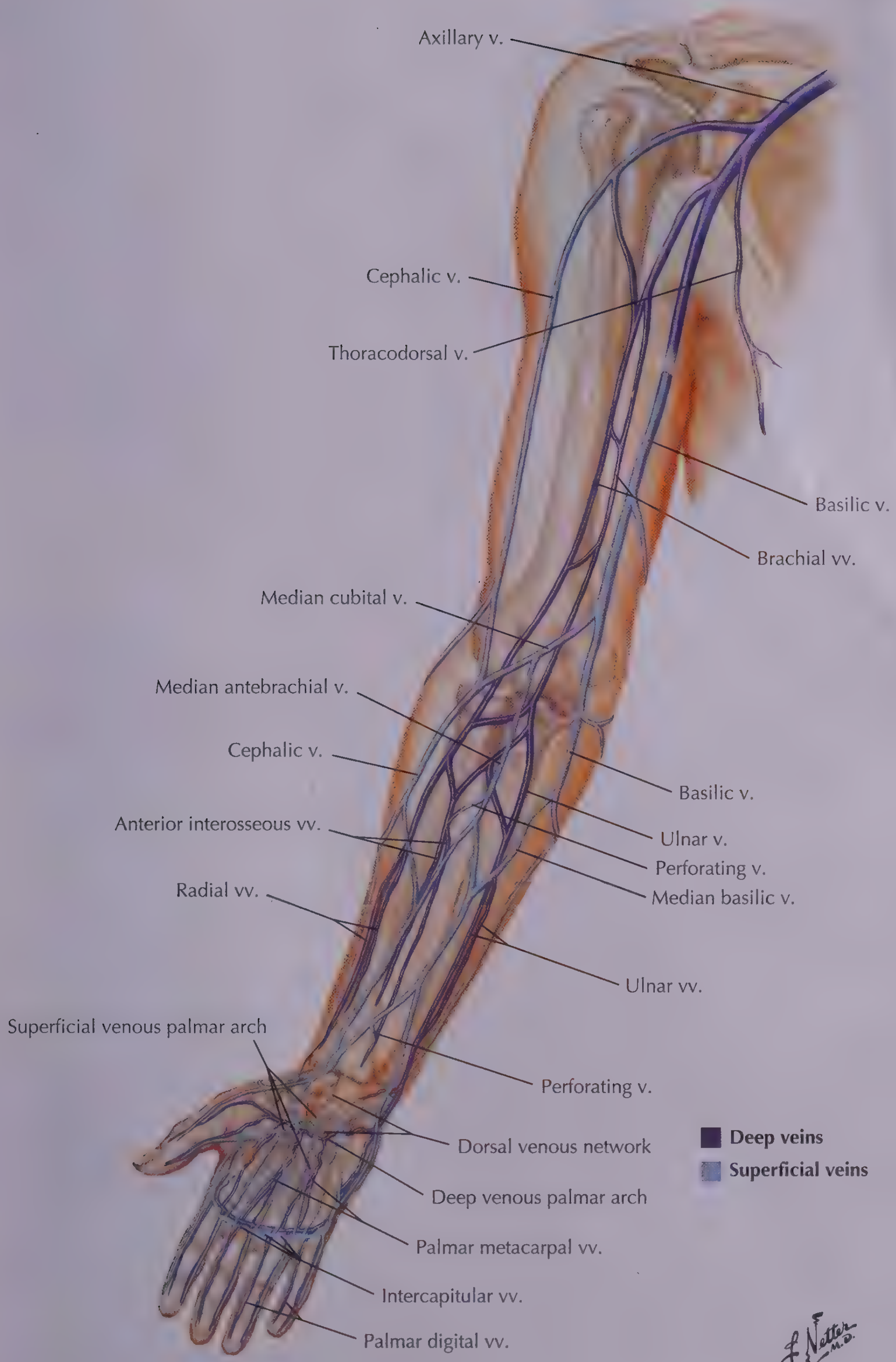
Arteries of Upper Limb

See also Plates 457, 476, BP 96, BP 97



Clavicular branch
Pectoral branch
Acromial branch
Deltoid branch
Thoracoacromial a.
Superior thoracic a.
Axillary a.
Anterior circumflex humeral a.
Lateral thoracic a.
Posterior circumflex humeral a.
Subscapular a.
Circumflex scapular a.
Brachial a.
Thoracodorsal a.
Deep brachial a.
Lower margin of teres major m. is landmark for boundary between axillary and brachial aa.
Radial collateral a.
Middle collateral a.
Superior ulnar collateral a.
Inferior ulnar collateral a.
Radial recurrent a.
Recurrent interosseous a.
Anterior ulnar recurrent a.
Posterior interosseous a.
Posterior ulnar recurrent a.
Radial a.
Common interosseous a.
Anterior interosseous a.
Ulnar a.
Superficial palmar branch of radial a.
Deep palmar arch
Dorsal carpal branch of ulnar a.
Princeps pollicis a.
Deep palmar branch of ulnar a.
Radialis indicis a.
Palmar metacarpal aa.
Superficial palmar arch
Palmar digital a.
Common palmar digital aa.
Proper palmar digital aa.
F. Netter M.D.

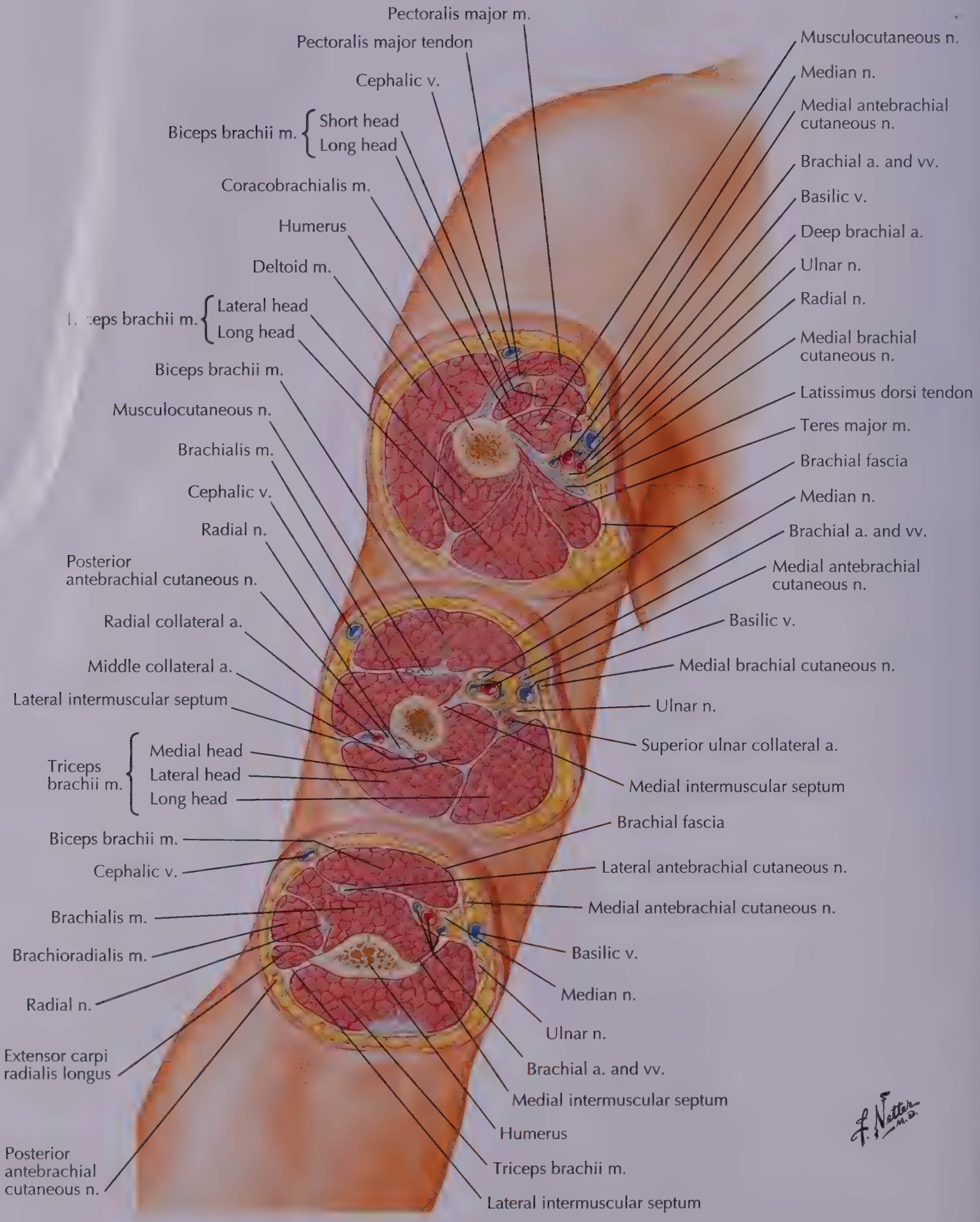
See also Plate 426


Axillary v.
Cephalic v.
Thoracodorsal v.
Basilic v.
Brachial vv.
Median cubital v.
Median antebrachial v.
Cephalic v.
Basilic v.
Anterior interosseous vv.
Ulnar v.
Perforating v.
Median basilic v.
Radial vv.
Ulnar vv.
Superficial venous palmar arch
Perforating v.
Dorsal venous network
Deep venous palmar arch
Palmar metacarpal vv.
Intercapitular vv.
Palmar digital vv.
F. Netter M.D.

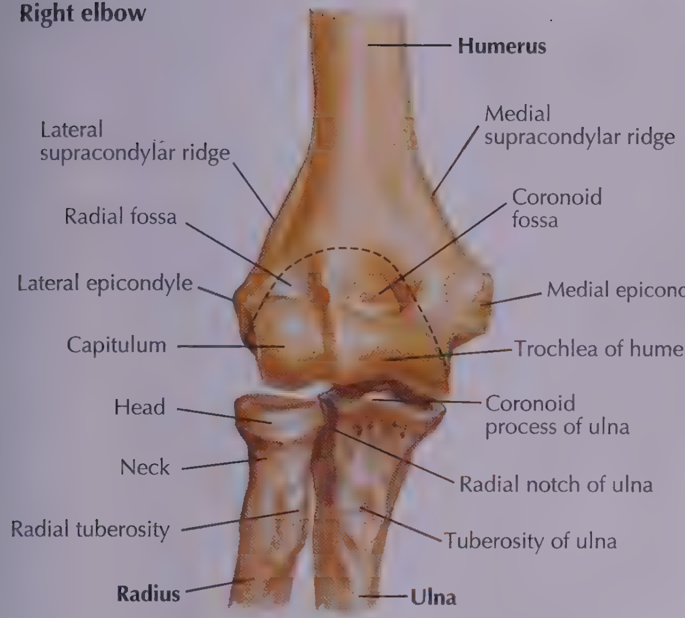
■ **Deep veins**

▨ **Superficial veins**

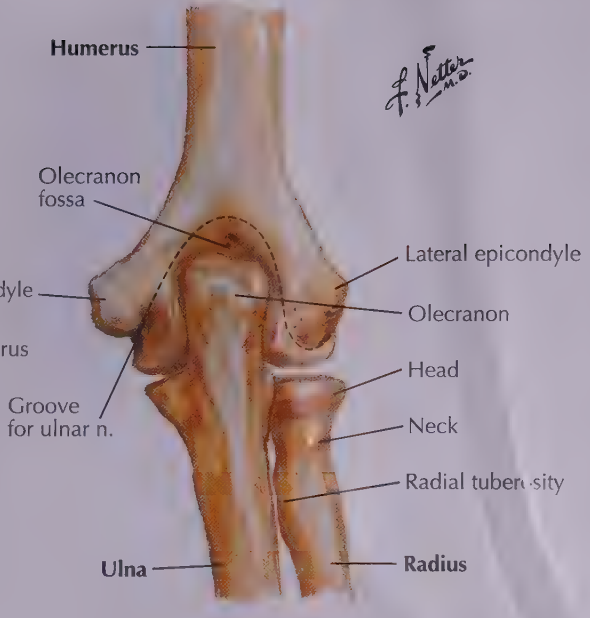
Arm: Serial Cross Sections


Pectoralis major m.
Pectoralis major tendon
Cephalic v.
Biceps brachii m.
Short head
Long head
Coracobrachialis m.
Humerus
Deltoid m.
Triceps brachii m.
Lateral head
Long head
Biceps brachii m.
Musculocutaneous n.
Brachialis m.
Cephalic v.
Radial n.
Posterior antebrachial cutaneous n.
Radial collateral a.
Middle collateral a.
Lateral intermuscular septum
Triceps brachii m.
Medial head
Lateral head
Long head
Biceps brachii m.
Cephalic v.
Brachialis m.
Brachioradialis m.
Radial n.
Extensor carpi radialis longus
Posterior antebrachial cutaneous n.
Musculocutaneous n.
Median n.
Medial antebrachial cutaneous n.
Brachial a. and vv.
Basilic v.
Deep brachial a.
Ulnar n.
Radial n.
Medial brachial cutaneous n.
Latissimus dorsi tendon
Teres major m.
Brachial fascia
Median n.
Brachial a. and vv.
Medial antebrachial cutaneous n.
Basilic v.
Medial brachial cutaneous n.
Ulnar n.
Superior ulnar collateral a.
Medial intermuscular septum
Brachial fascia
Lateral antebrachial cutaneous n.
Medial antebrachial cutaneous n.
Basilic v.
Median n.
Ulnar n.
Brachial a. and vv.
Medial intermuscular septum
Humerus
Triceps brachii m.
Lateral intermuscular septum
F. Netter M.D.

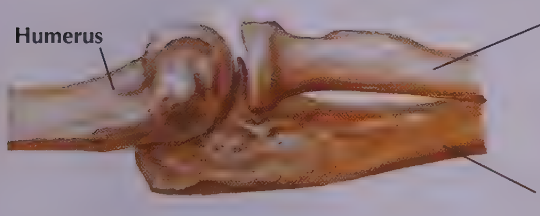
Right elbow


Humerus
Medial supracondylar ridge
Lateral supracondylar ridge
Radial fossa
Coronoid fossa
Lateral epicondyle
Medial epicondyle
Capitulum
Trochlea of humerus
Head
Coronoid process of ulna
Neck
Radial notch of ulna
Radial tuberosity
Tuberosity of ulna
Radius
Ulna

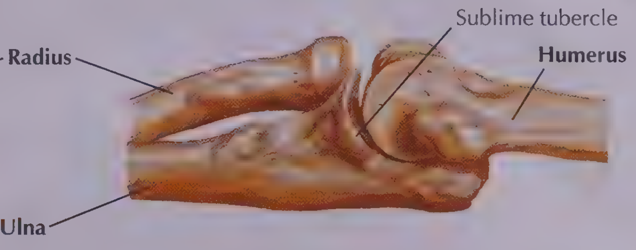
In extension: anterior view


Humerus
Olecranon fossa
Lateral epicondyle
Olecranon
Head
Groove for ulnar n.
Neck
Radial tuberosity
Ulna
Radius

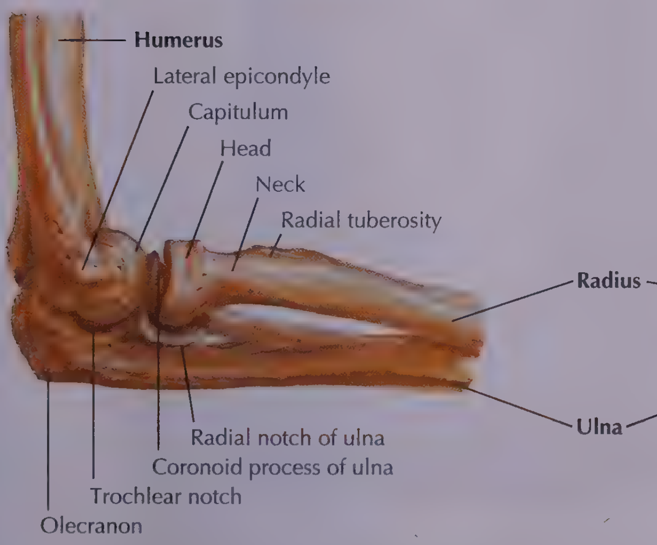
In extension: posterior view


Humerus
Ulna

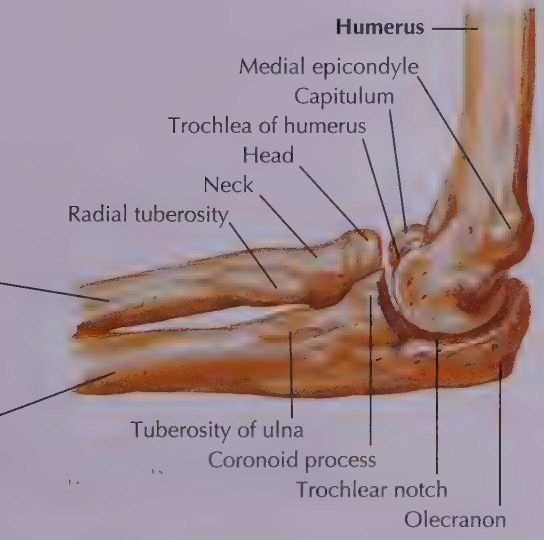
In extension: lateral view


Radius
Sublime tubercle
Humerus

In extension: medial view


Humerus
Lateral epicondyle
Capitulum
Head
Neck
Radial tuberosity
Radius
Ulna
Radial notch of ulna
Coronoid process of ulna
Trochlear notch
Olecranon

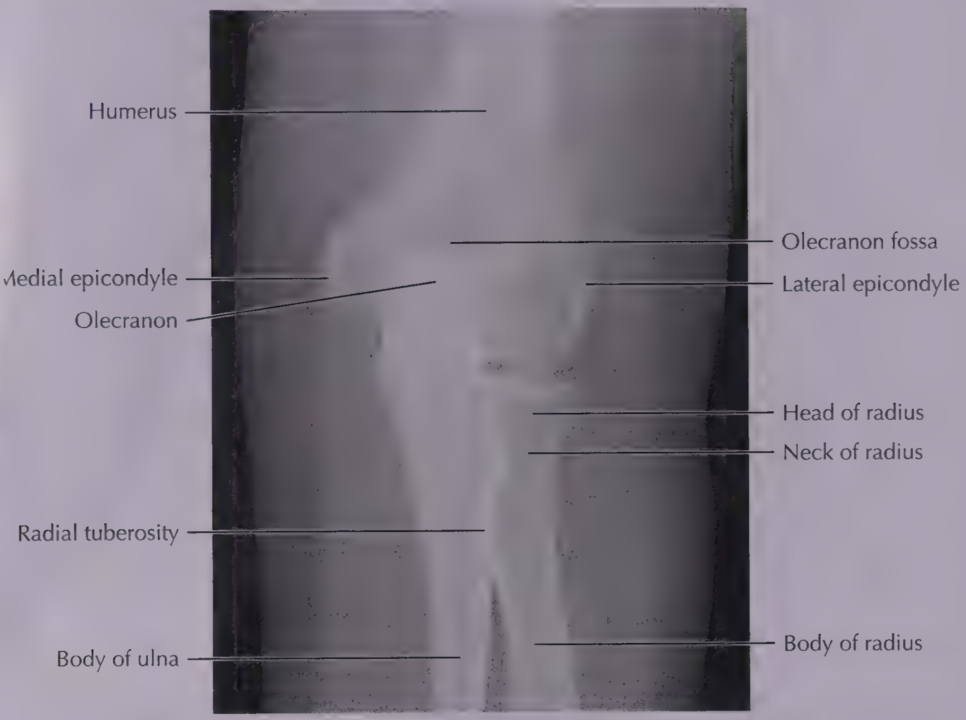
In 90 degrees of flexion: lateral view


Humerus
Medial epicondyle
Capitulum
Trochlea of humerus
Head
Neck
Radial tuberosity
Tuberosity of ulna
Coronoid process
Trochlear notch
Olecranon

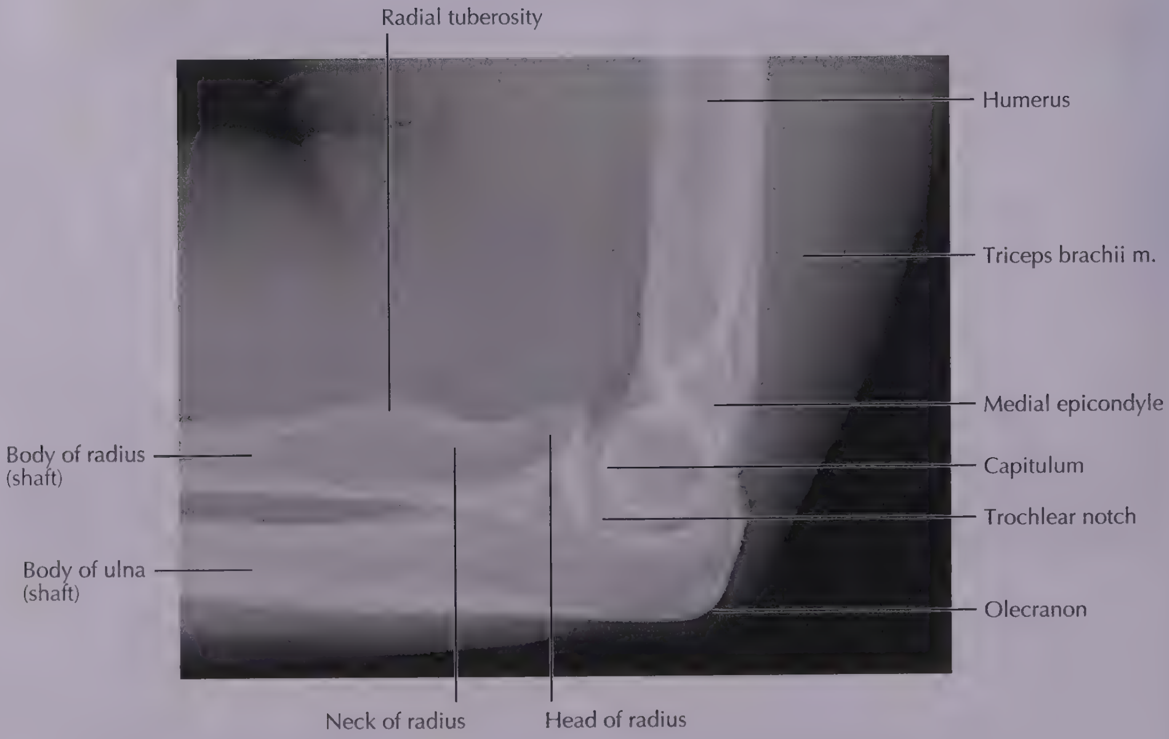
In 90 degrees of flexion: medial view

Elbow: Radiographs

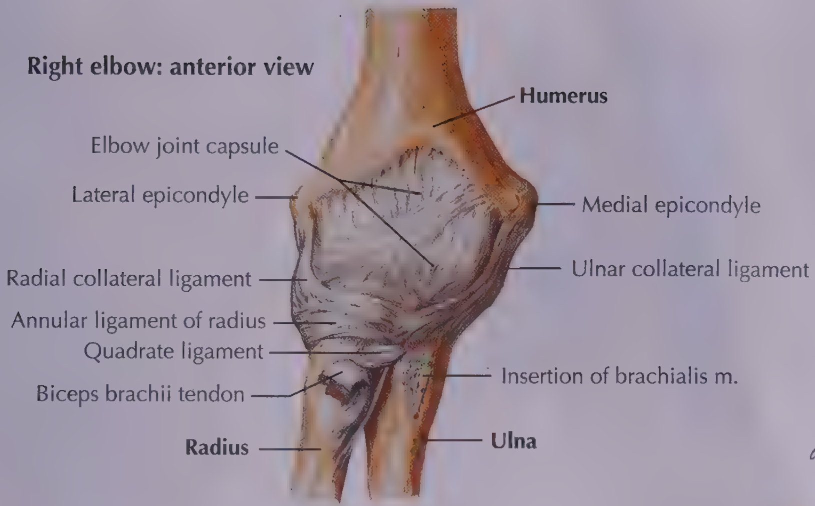
Anteroposterior view


Humerus
Olecranon fossa
Medial epicondyle
Lateral epicondyle
Olecranon
Head of radius
Neck of radius
Radial tuberosity
Body of ulna
Body of radius

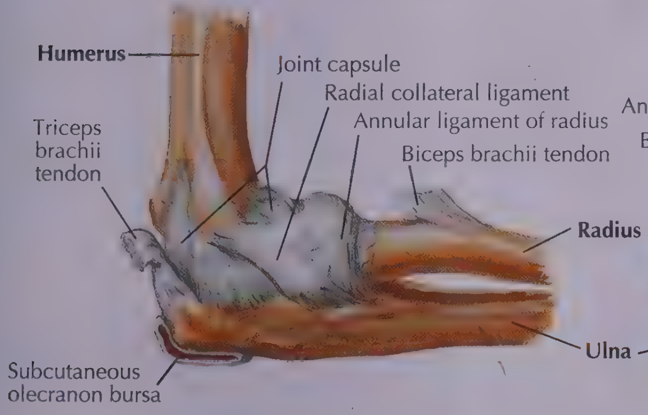
Lateral view


Radial tuberosity
Humerus
Triceps brachii m.
Medial epicondyle
Body of radius (shaft)
Capitulum
Trochlear notch
Body of ulna (shaft)
Olecranon
Neck of radius
Head of radius

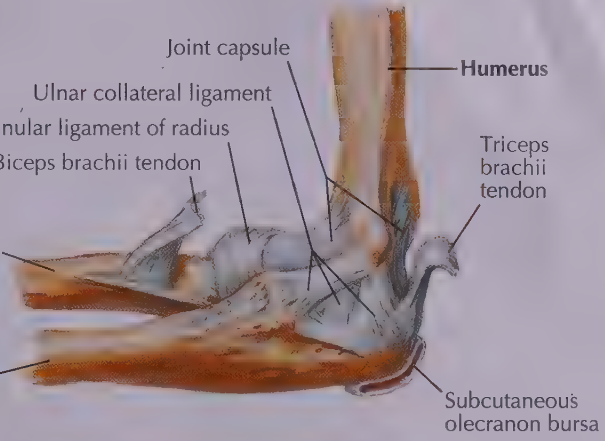
Right elbow: anterior view


Humerus
Elbow joint capsule
Lateral epicondyle
Medial epicondyle
Radial collateral ligament
Ulnar collateral ligament
Annular ligament of radius
Quadrate ligament
Insertion of brachialis m.
Biceps brachii tendon
Radius
Ulna

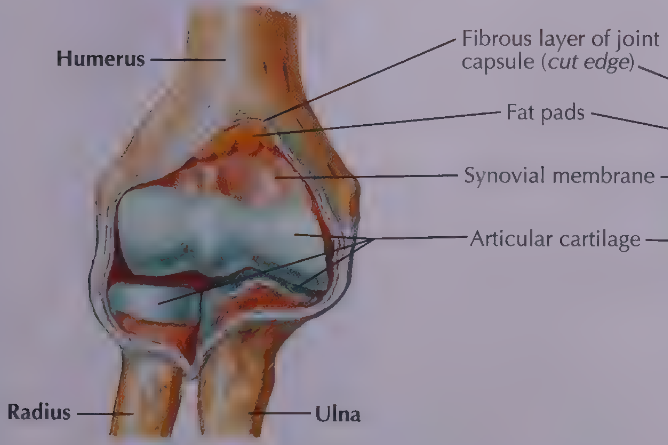
In 90 degrees of flexion: lateral view


Humerus
Joint capsule
Radial collateral ligament
Annular ligament of radius
Triceps brachii tendon
Biceps brachii tendon
Radius
Ulna
Subcutaneous olecranon bursa

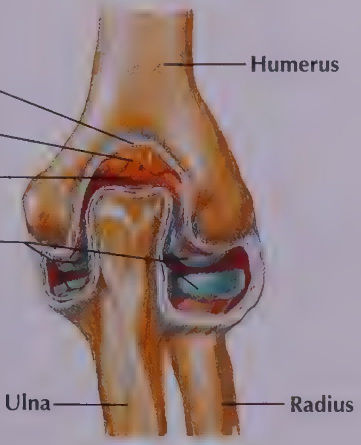
In 90 degrees of flexion: medial view


Joint capsule
Humerus
Ulnar collateral ligament
Annular ligament of radius
Biceps brachii tendon
Triceps brachii tendon
Subcutaneous olecranon bursa

Opened joint: anterior view

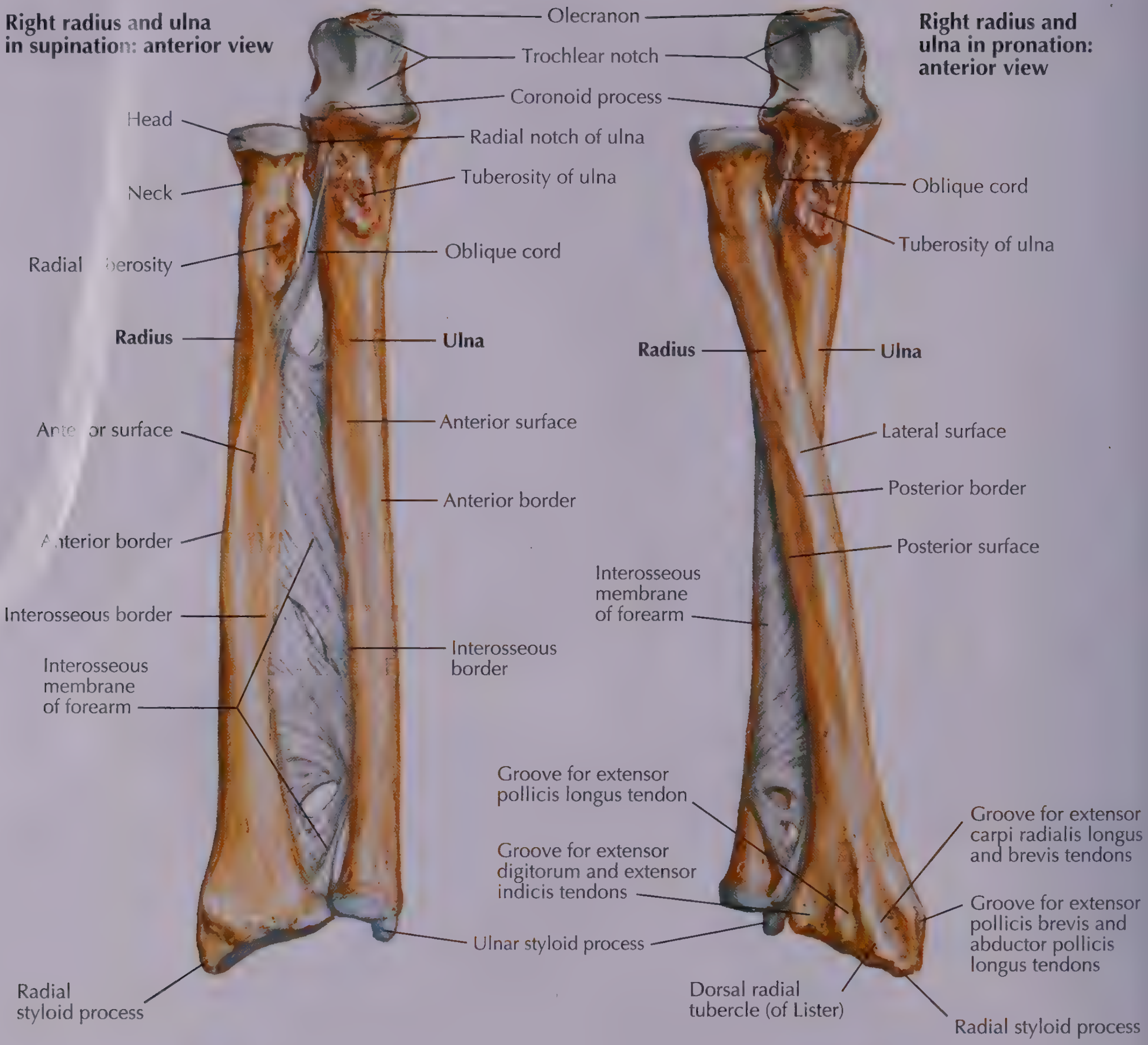

Humerus
Fibrous layer of joint capsule (*cut edge*)
Fat pads
Synovial membrane
Articular cartilage
Radius
Ulna

Opened joint: posterior view


Humerus
Ulna
Radius

Bones of Forearm

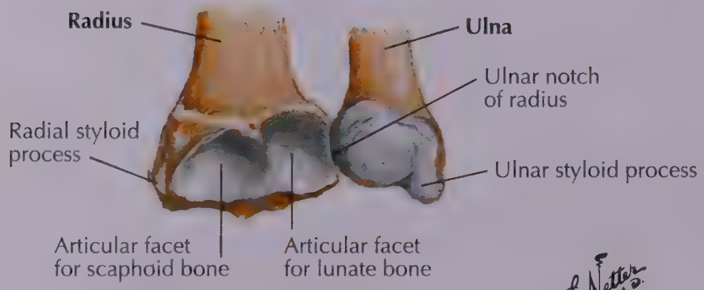
See also Plate 460



Right radius and ulna in supination: anterior view

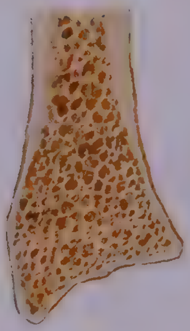
Right radius and ulna in pronation: anterior view

Olecranon
Trochlear notch
Coronoid process
Head
Radial notch of ulna
Neck
Tuberosity of ulna
Radial tuberosity
Oblique cord
Radius
Ulna
Anterior surface
Anterior surface
Anterior border
Anterior border
Interosseous border
Interosseous border
Interosseous membrane of forearm
Radial styloid process
Ulnar styloid process
Oblique cord
Tuberosity of ulna
Radius
Ulna
Lateral surface
Posterior border
Posterior surface
Interosseous membrane of forearm
Groove for extensor pollicis longus tendon
Groove for extensor digitorum and extensor indicis tendons
Groove for extensor carpi radialis longus and brevis tendons
Groove for extensor pollicis brevis and abductor pollicis longus tendons
Dorsal radial tubercle (of Lister)
Radial styloid process



Carpal articular surface

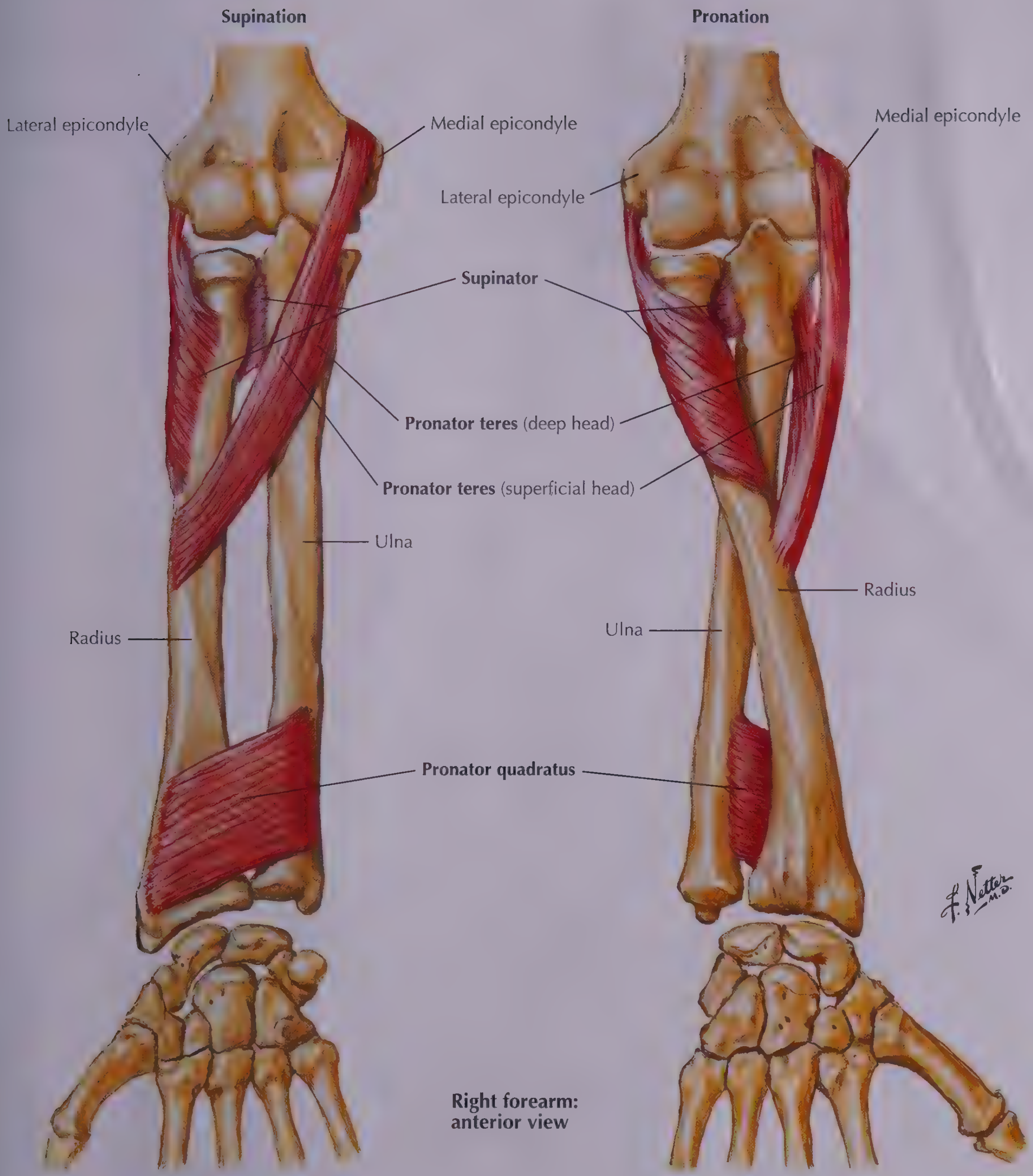
Radius
Ulna
Ulnar notch of radius
Radial styloid process
Ulnar styloid process
Articular facet for scaphoid bone
Articular facet for lunate bone



Radius (coronal section): the cortical bone of body of radius is thicker than that of the distal end of the radius

Muscles of Forearm: Pronators and Supinator

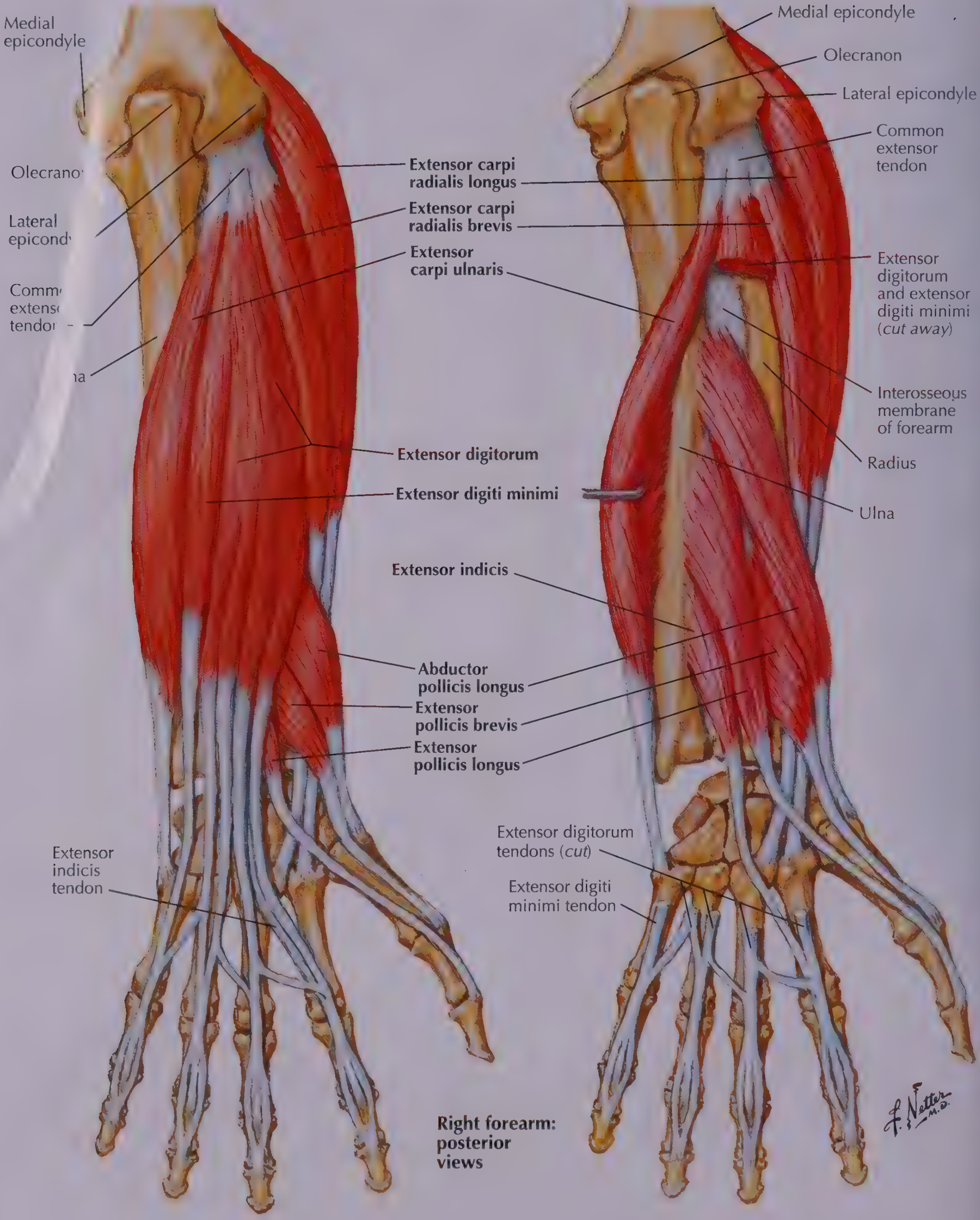
See also Plate 458


Supination
Pronation
Lateral epicondyle
Medial epicondyle
Lateral epicondyle
Medial epicondyle
Supinator
Pronator teres (deep head)
Pronator teres (superficial head)
Ulna
Radius
Radius
Ulna
Pronator quadratus
F. Netter M.D.

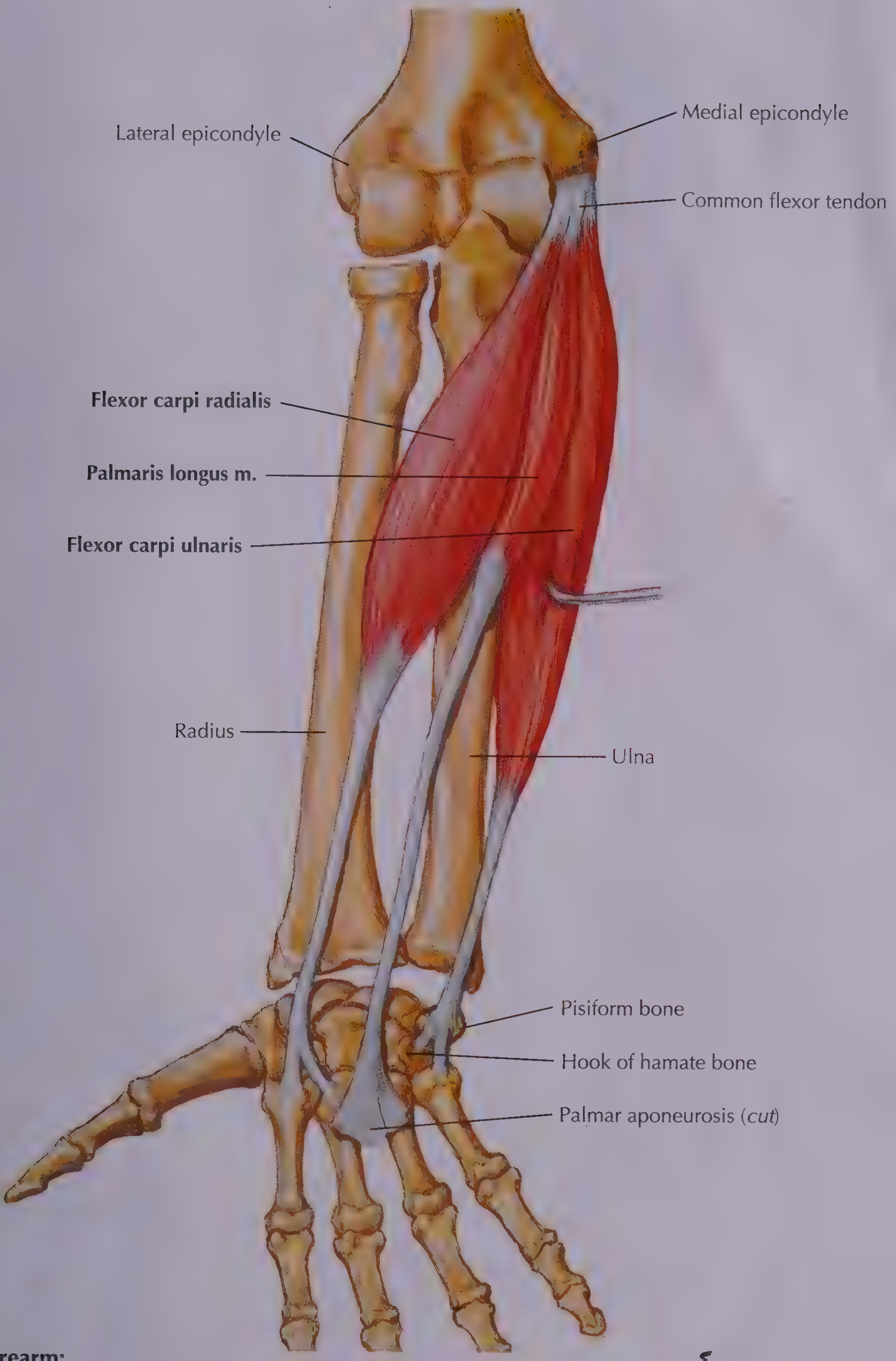
Right forearm: anterior view

Muscles of Forearm: Extensors of Wrist and Digits

See also Plate 461

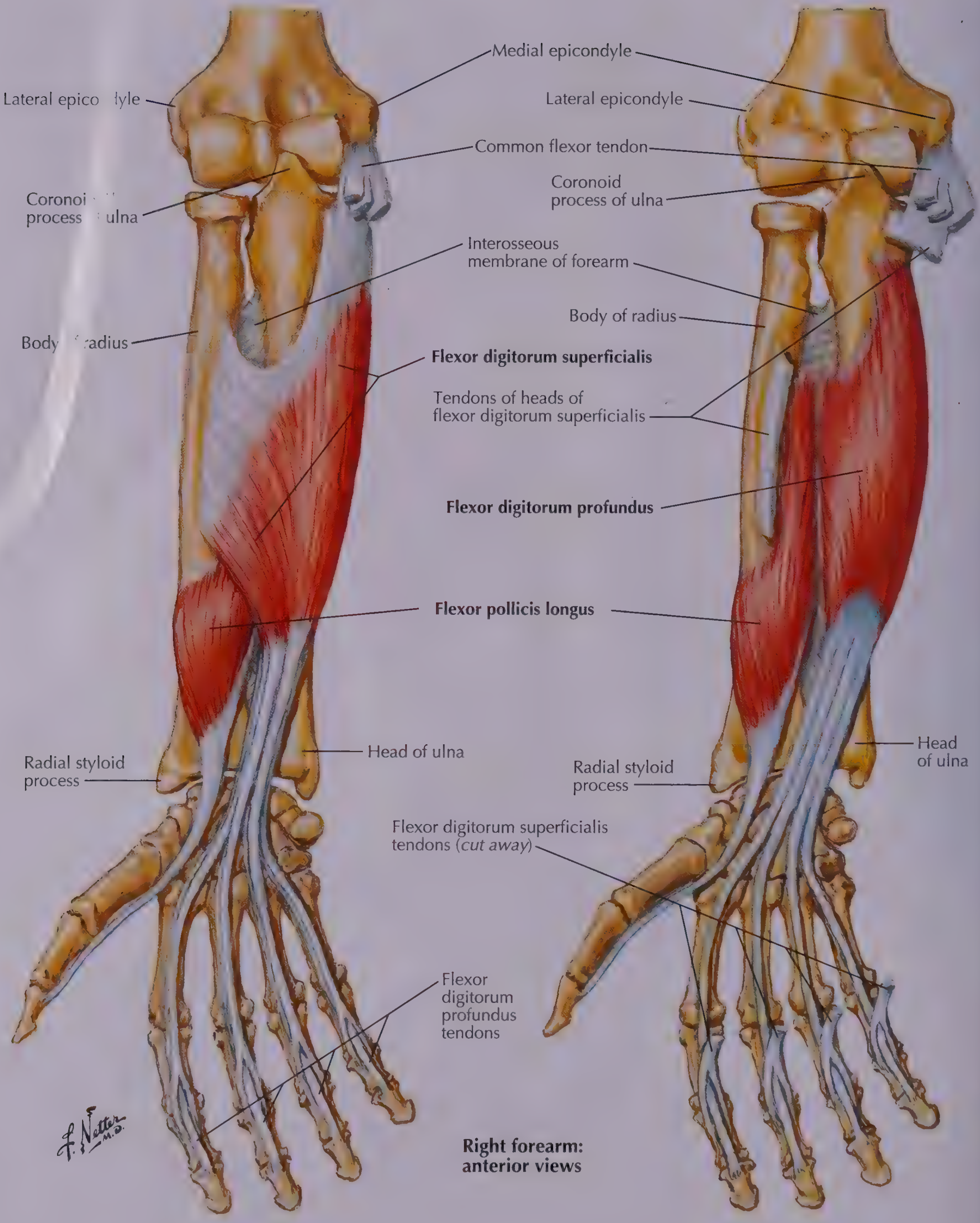

Medial epicondyle
Olecrano
Lateral epicond
Comm extens tendon
na
Extensor carpi radialis longus
Extensor carpi radialis brevis
Extensor carpi ulnaris
Extensor digitorum
Extensor digiti minimi
Extensor indicis
Abductor pollicis longus
Extensor pollicis brevis
Extensor pollicis longus
Extensor indicis tendon
Medial epicondyle
Olecranon
Lateral epicondyle
Common extensor tendon
Extensor digitorum and extensor digiti minimi (cut away)
Interosseous membrane of forearm
Radius
Ulna
Extensor digitorum tendons (cut)
Extensor digiti minimi tendon
F. Netter M.D.

Right forearm: posterior views


Lateral epicondyle
Medial epicondyle
Common flexor tendon
Flexor carpi radialis
Palmaris longus m.
Flexor carpi ulnaris
Radius
Ulna
Pisiform bone
Hook of hamate bone
Palmar aponeurosis (*cut*)
F. Netter M.D.

Right forearm: anterior view

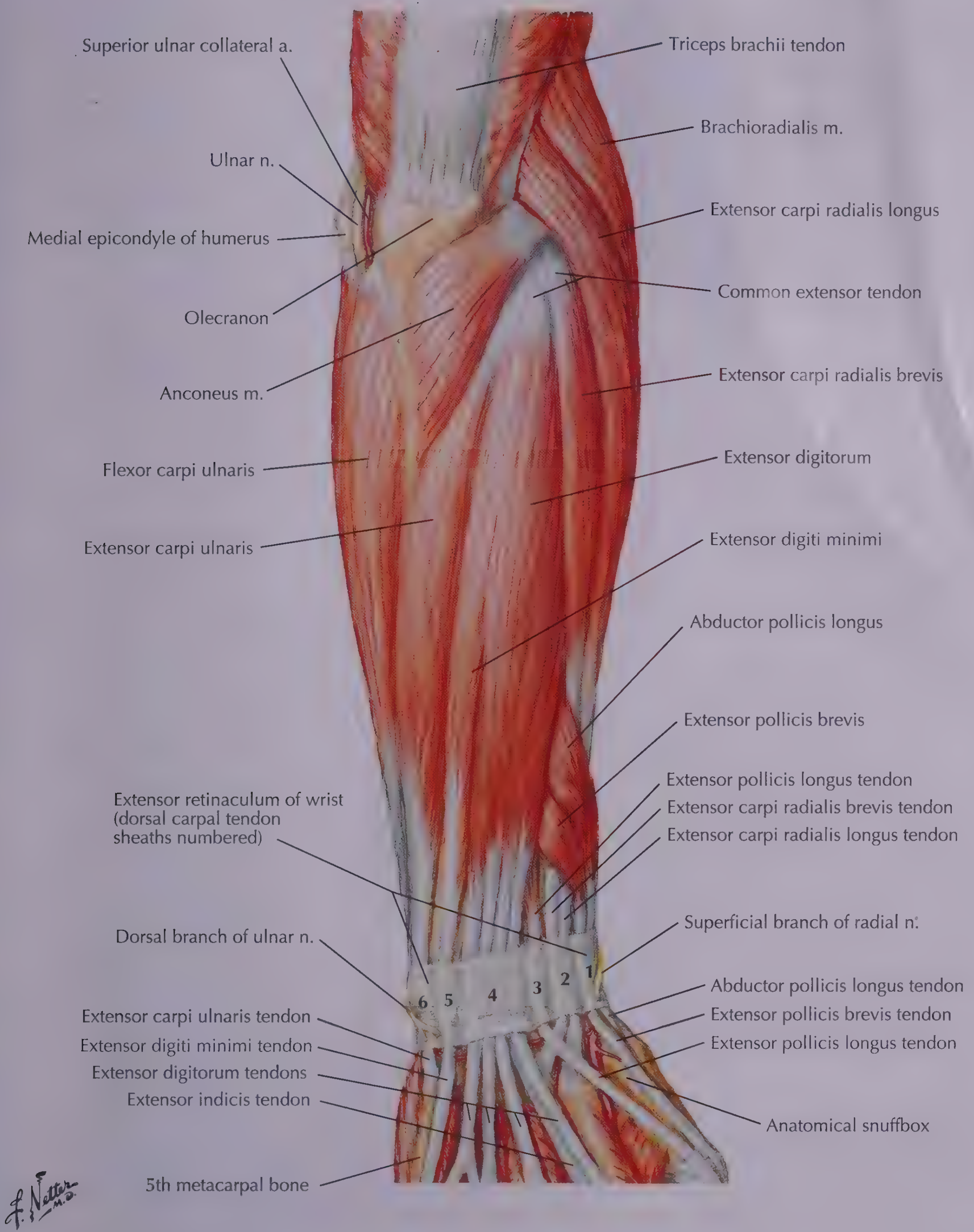
Muscles of Forearm: Flexors of Digits


Medial epicondyle
Lateral epicondyle
Lateral epicondyle
Common flexor tendon
Coronoid process of ulna
Coronoid process of ulna
Interosseous membrane of forearm
Body of radius
Body of radius
Flexor digitorum superficialis
Tendons of heads of flexor digitorum superficialis
Flexor digitorum profundus
Flexor pollicis longus
Head of ulna
Head of ulna
Radial styloid process
Radial styloid process
Flexor digitorum superficialis tendons (*cut away*)
Flexor digitorum profundus tendons
F. Netter M.D.

Right forearm: anterior views

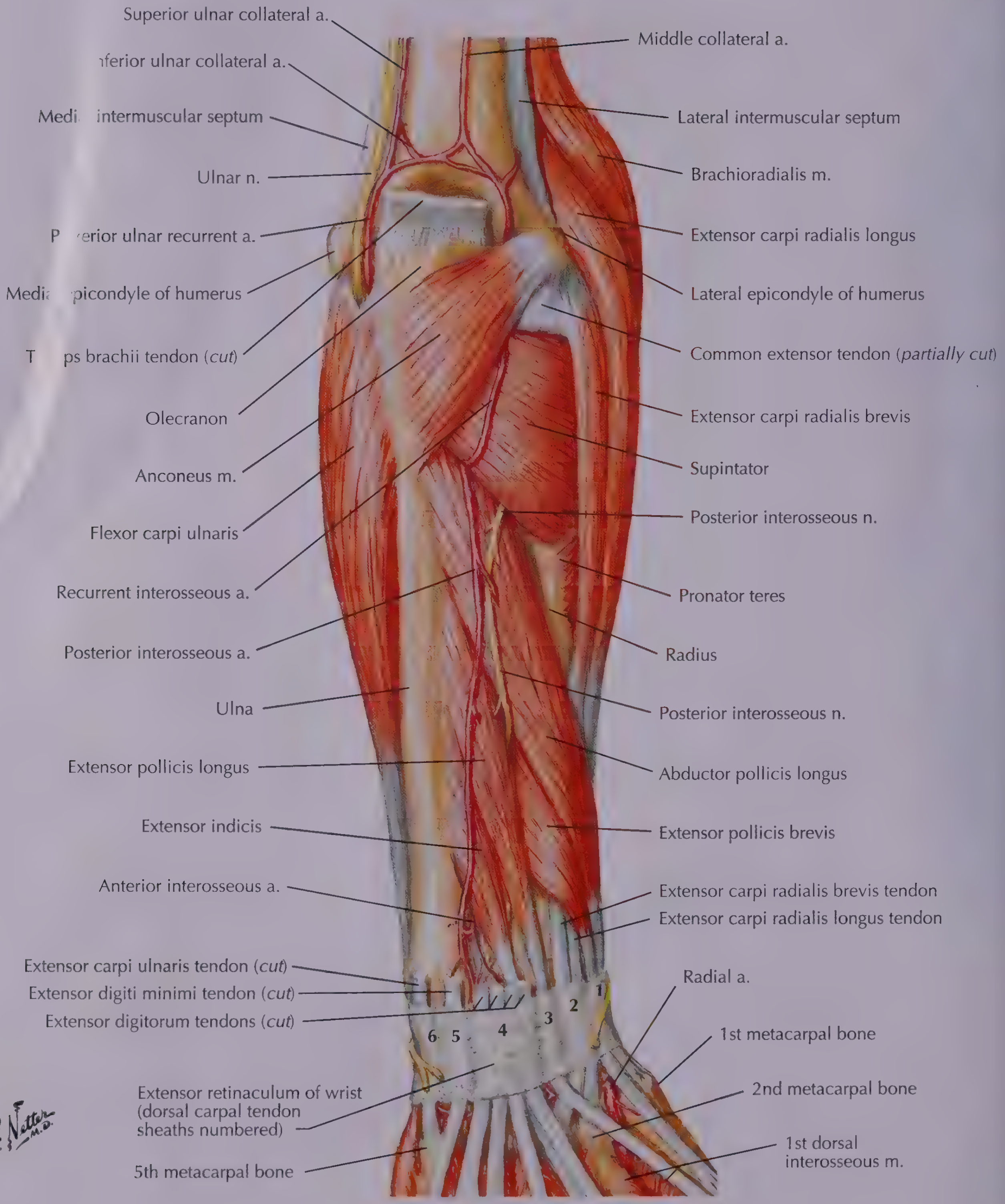
Muscles of Forearm: Superficial Part of Posterior Compartment

See also Plates 480, 489


Superior ulnar collateral a.
Ulnar n.
Medial epicondyle of humerus
Olecranon
Anconeus m.
Flexor carpi ulnaris
Extensor carpi ulnaris
Triceps brachii tendon
Brachioradialis m.
Extensor carpi radialis longus
Common extensor tendon
Extensor carpi radialis brevis
Extensor digitorum
Extensor digiti minimi
Abductor pollicis longus
Extensor pollicis brevis
Extensor pollicis longus tendon
Extensor carpi radialis brevis tendon
Extensor carpi radialis longus tendon
Extensor retinaculum of wrist (dorsal carpal tendon sheaths numbered)
Superficial branch of radial n.
6
5
4
3
2
1
Dorsal branch of ulnar n.
Extensor carpi ulnaris tendon
Extensor digiti minimi tendon
Extensor digitorum tendons
Extensor indicis tendon
5th metacarpal bone
Abductor pollicis longus tendon
Extensor pollicis brevis tendon
Extensor pollicis longus tendon
Anatomical snuffbox
F. Netter M.D.

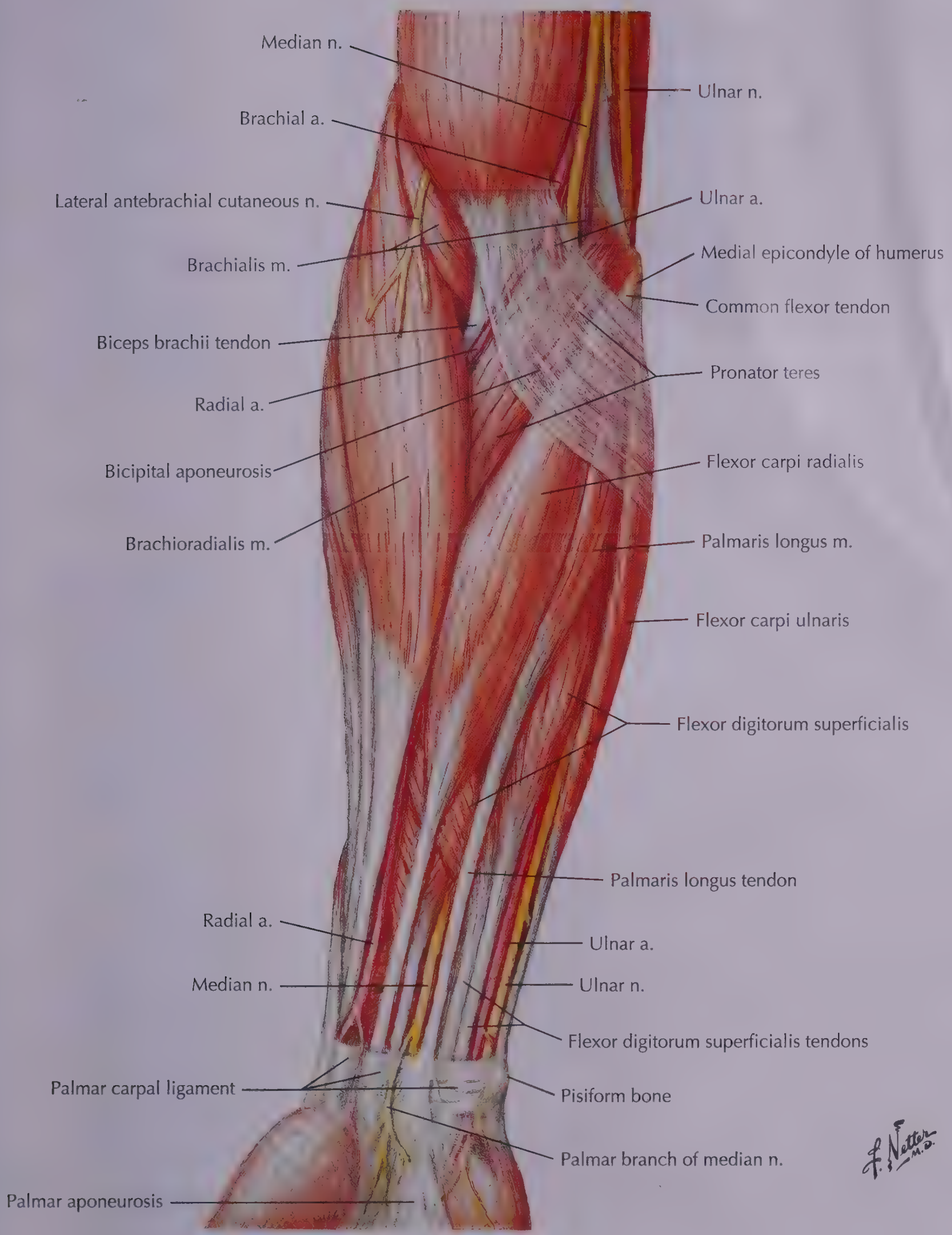
Muscles of Forearm: Deep Part of Posterior Compartment

See also Plate 480

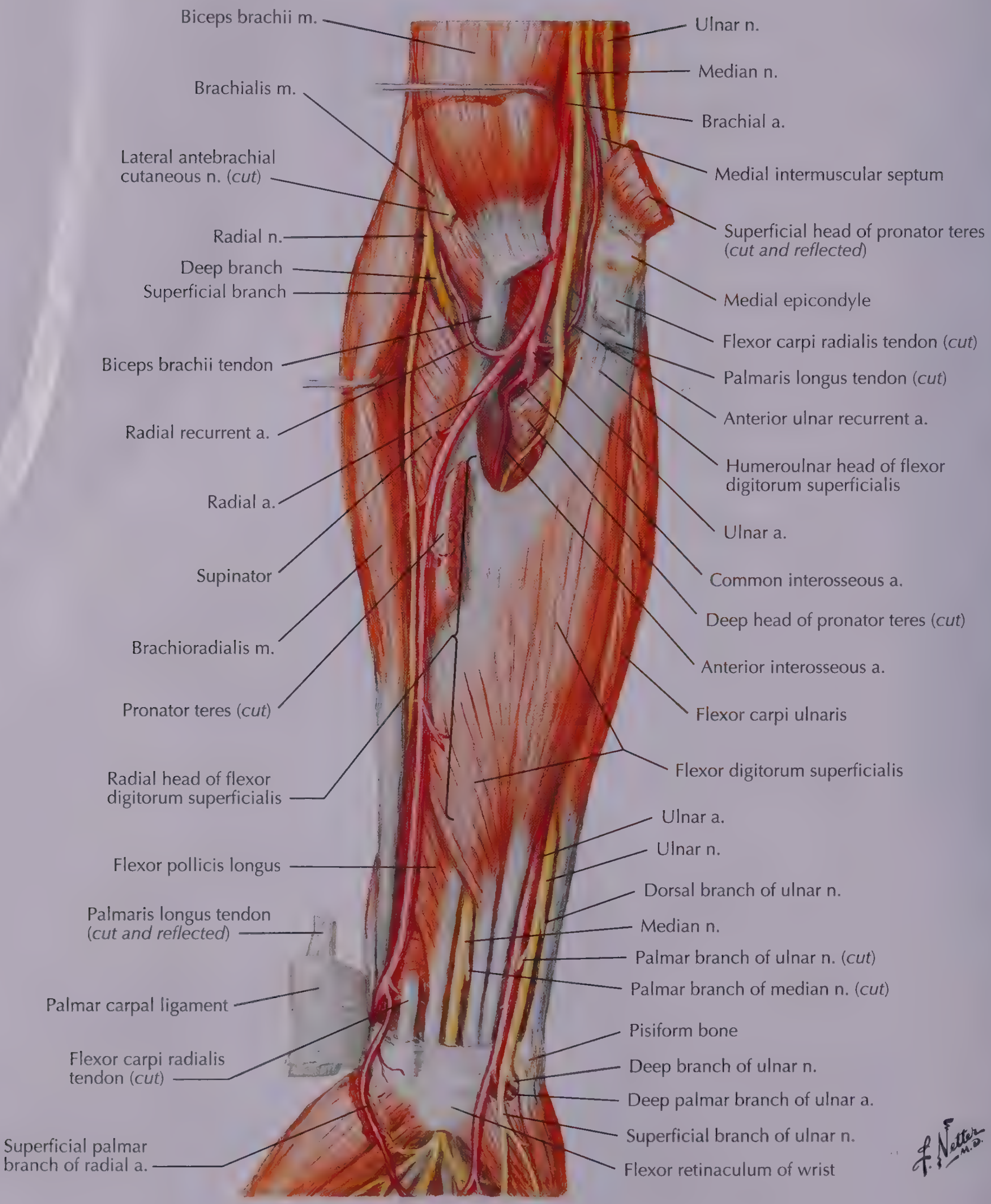

Superior ulnar collateral a.
Inferior ulnar collateral a.
Medial intermuscular septum
Ulnar n.
Posterior ulnar recurrent a.
Medial epicondyle of humerus
Triceps brachii tendon (cut)
Olecranon
Anconeus m.
Flexor carpi ulnaris
Recurrent interosseous a.
Posterior interosseous a.
Ulna
Extensor pollicis longus
Extensor indicis
Anterior interosseous a.
Extensor carpi ulnaris tendon (cut)
Extensor digiti minimi tendon (cut)
Extensor digitorum tendons (cut)
Extensor retinaculum of wrist (dorsal carpal tendon sheaths numbered)
5th metacarpal bone
Middle collateral a.
Lateral intermuscular septum
Brachioradialis m.
Extensor carpi radialis longus
Lateral epicondyle of humerus
Common extensor tendon (partially cut)
Extensor carpi radialis brevis
Supintator
Posterior interosseous n.
Pronator teres
Radius
Posterior interosseous n.
Abductor pollicis longus
Extensor pollicis brevis
Extensor carpi radialis brevis tendon
Extensor carpi radialis longus tendon
Radial a.
1st metacarpal bone
2nd metacarpal bone
1st dorsal interosseous m.
1
2
3
4
5
6
F. Netter M.D.

Muscles of Forearm: Superficial Part of Anterior Compartment

See also Plates 486, 487

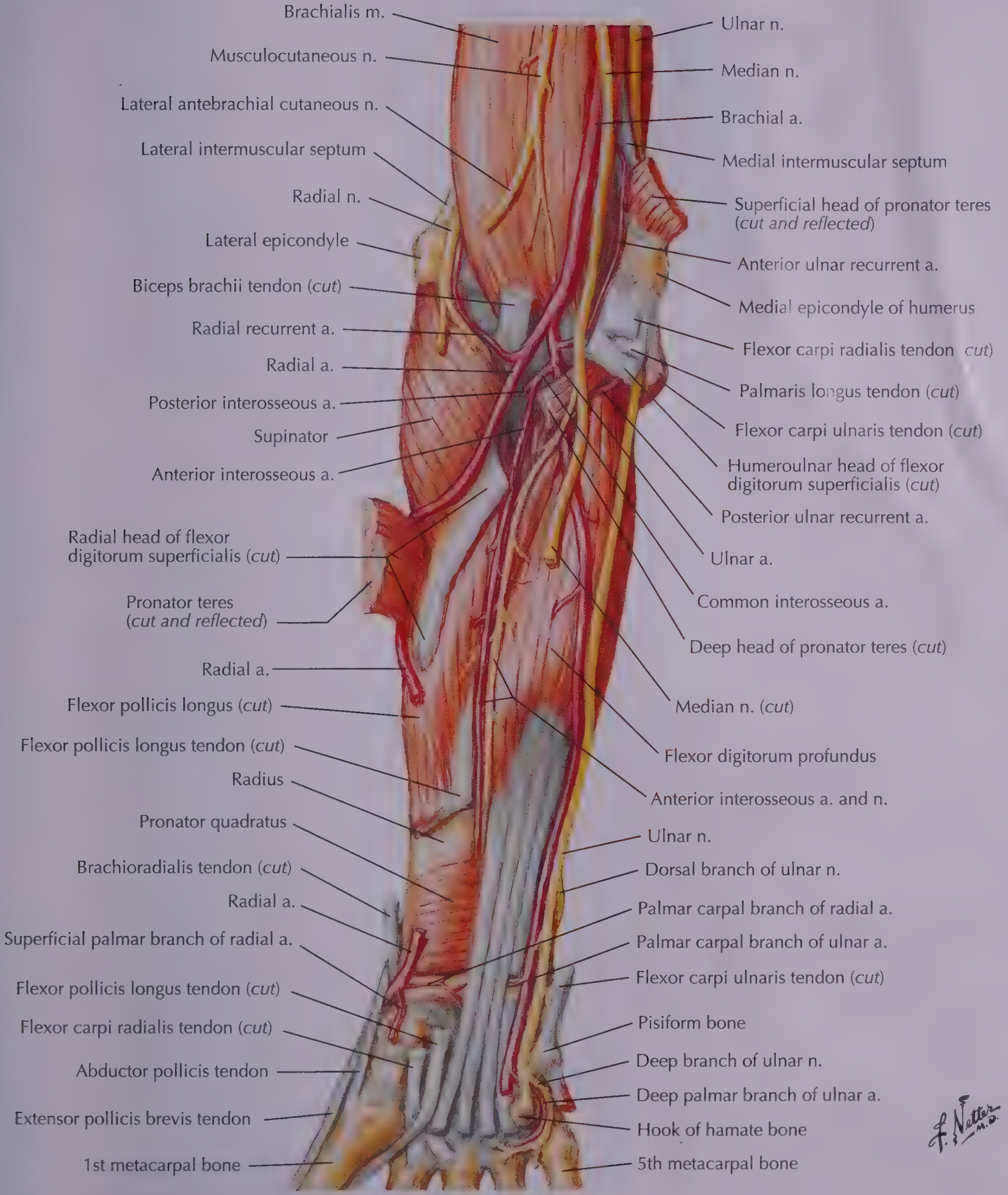

Median n.
Ulnar n.
Brachial a.
Lateral antebrachial cutaneous n.
Ulnar a.
Brachialis m.
Medial epicondyle of humerus
Common flexor tendon
Biceps brachii tendon
Pronator teres
Radial a.
Bicipital aponeurosis
Flexor carpi radialis
Brachioradialis m.
Palmaris longus m.
Flexor carpi ulnaris
Flexor digitorum superficialis
Palmaris longus tendon
Radial a.
Ulnar a.
Median n.
Ulnar n.
Flexor digitorum superficialis tendons
Palmar carpal ligament
Pisiform bone
Palmar branch of median n.
Palmar aponeurosis
F. Netter M.D.

See also Plates 443, 486

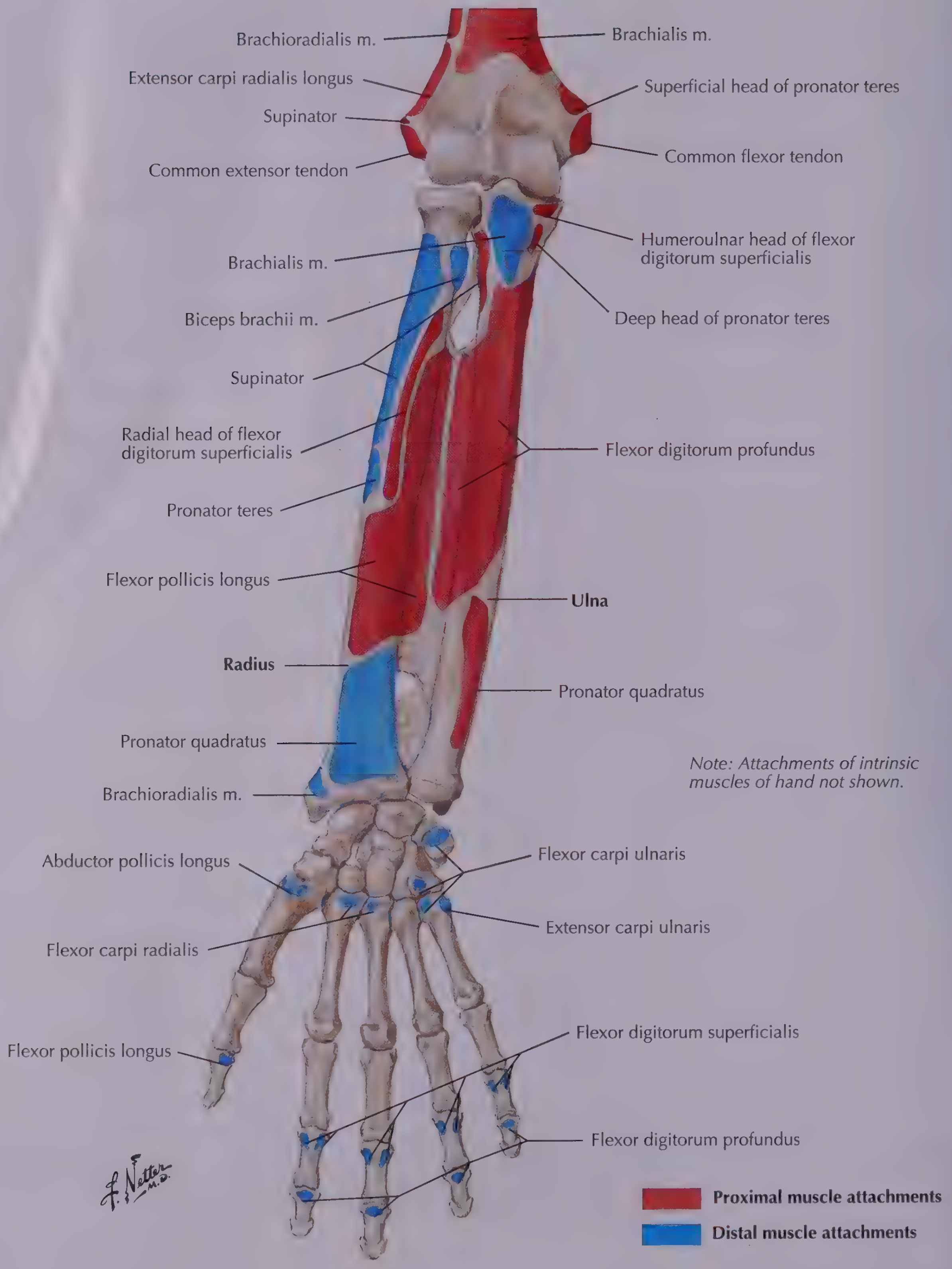

Biceps brachii m.
Brachialis m.
Lateral antebrachial cutaneous n. (*cut*)
Radial n.
Deep branch
Superficial branch
Biceps brachii tendon
Radial recurrent a.
Radial a.
Supinator
Brachioradialis m.
Pronator teres (*cut*)
Radial head of flexor digitorum superficialis
Flexor pollicis longus
Palmaris longus tendon (*cut and reflected*)
Palmar carpal ligament
Flexor carpi radialis tendon (*cut*)
Superficial palmar branch of radial a.
Ulnar n.
Median n.
Brachial a.
Medial intermuscular septum
Superficial head of pronator teres (*cut and reflected*)
Medial epicondyle
Flexor carpi radialis tendon (*cut*)
Palmaris longus tendon (*cut*)
Anterior ulnar recurrent a.
Humeroulnar head of flexor digitorum superficialis
Ulnar a.
Common interosseous a.
Deep head of pronator teres (*cut*)
Anterior interosseous a.
Flexor carpi ulnaris
Flexor digitorum superficialis
Ulnar a.
Ulnar n.
Dorsal branch of ulnar n.
Median n.
Palmar branch of ulnar n. (*cut*)
Palmar branch of median n. (*cut*)
Pisiform bone
Deep branch of ulnar n.
Deep palmar branch of ulnar a.
Superficial branch of ulnar n.
Flexor retinaculum of wrist
F. Netter M.D.

Muscles of Forearm: Deep Part of Anterior Compartment

See also Plates 440, 487


Brachialis m.
Musculocutaneous n.
Lateral antebrachial cutaneous n.
Lateral intermuscular septum
Radial n.
Lateral epicondyle
Biceps brachii tendon (*cut*)
Radial recurrent a.
Radial a.
Posterior interosseous a.
Supinator
Anterior interosseous a.
Radial head of flexor digitorum superficialis (*cut*)
Pronator teres (*cut and reflected*)
Radial a.
Flexor pollicis longus (*cut*)
Flexor pollicis longus tendon (*cut*)
Radius
Pronator quadratus
Brachioradialis tendon (*cut*)
Radial a.
Superficial palmar branch of radial a.
Flexor pollicis longus tendon (*cut*)
Flexor carpi radialis tendon (*cut*)
Abductor pollicis tendon
Extensor pollicis brevis tendon
1st metacarpal bone
Ulnar n.
Median n.
Brachial a.
Medial intermuscular septum
Superficial head of pronator teres (*cut and reflected*)
Anterior ulnar recurrent a.
Medial epicondyle of humerus
Flexor carpi radialis tendon (*cut*)
Palmaris longus tendon (*cut*)
Flexor carpi ulnaris tendon (*cut*)
Humeroulnar head of flexor digitorum superficialis (*cut*)
Posterior ulnar recurrent a.
Ulnar a.
Common interosseous a.
Deep head of pronator teres (*cut*)
Median n. (*cut*)
Flexor digitorum profundus
Anterior interosseous a. and n.
Ulnar n.
Dorsal branch of ulnar n.
Palmar carpal branch of radial a.
Palmar carpal branch of ulnar a.
Flexor carpi ulnaris tendon (*cut*)
Pisiform bone
Deep branch of ulnar n.
Deep palmar branch of ulnar a.
Hook of hamate bone
5th metacarpal bone
F. Netter M.D.

Attachments of Muscles of Forearm: Anterior View

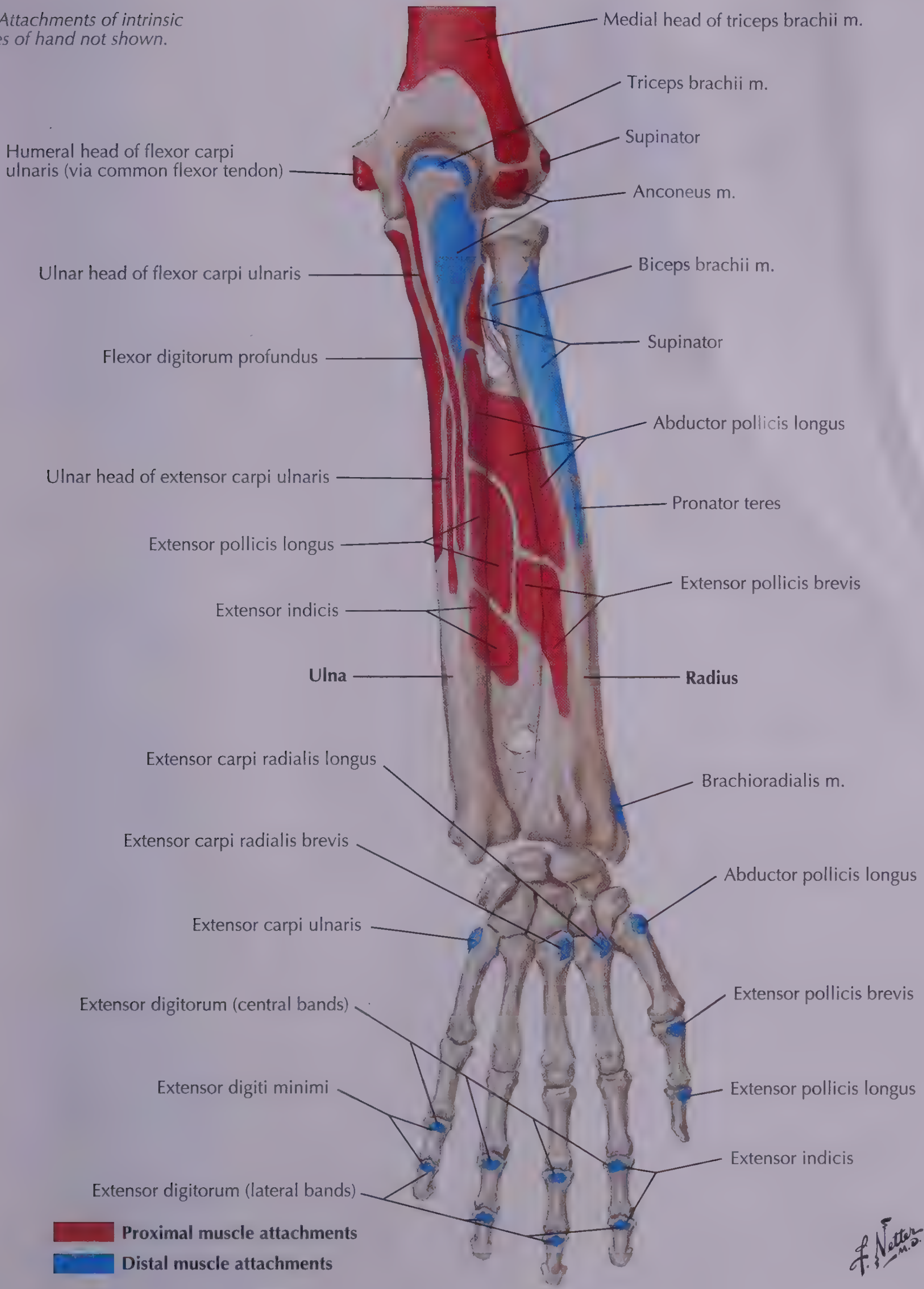

Brachioradialis m.
Brachialis m.
Extensor carpi radialis longus
Superficial head of pronator teres
Supinator
Common flexor tendon
Common extensor tendon
Humeroulnar head of flexor digitorum superficialis
Brachialis m.
Deep head of pronator teres
Biceps brachii m.
Supinator
Radial head of flexor digitorum superficialis
Flexor digitorum profundus
Pronator teres
Flexor pollicis longus
Ulna
Radius
Pronator quadratus
Pronator quadratus
Brachioradialis m.
Abductor pollicis longus
Flexor carpi ulnaris
Flexor carpi radialis
Extensor carpi ulnaris
Flexor pollicis longus
Flexor digitorum superficialis
Flexor digitorum profundus
🟥 Proximal muscle attachments
🟦 Distal muscle attachments

Note: Attachments of intrinsic muscles of hand not shown.

Attachments of Muscles of Forearm: Posterior View

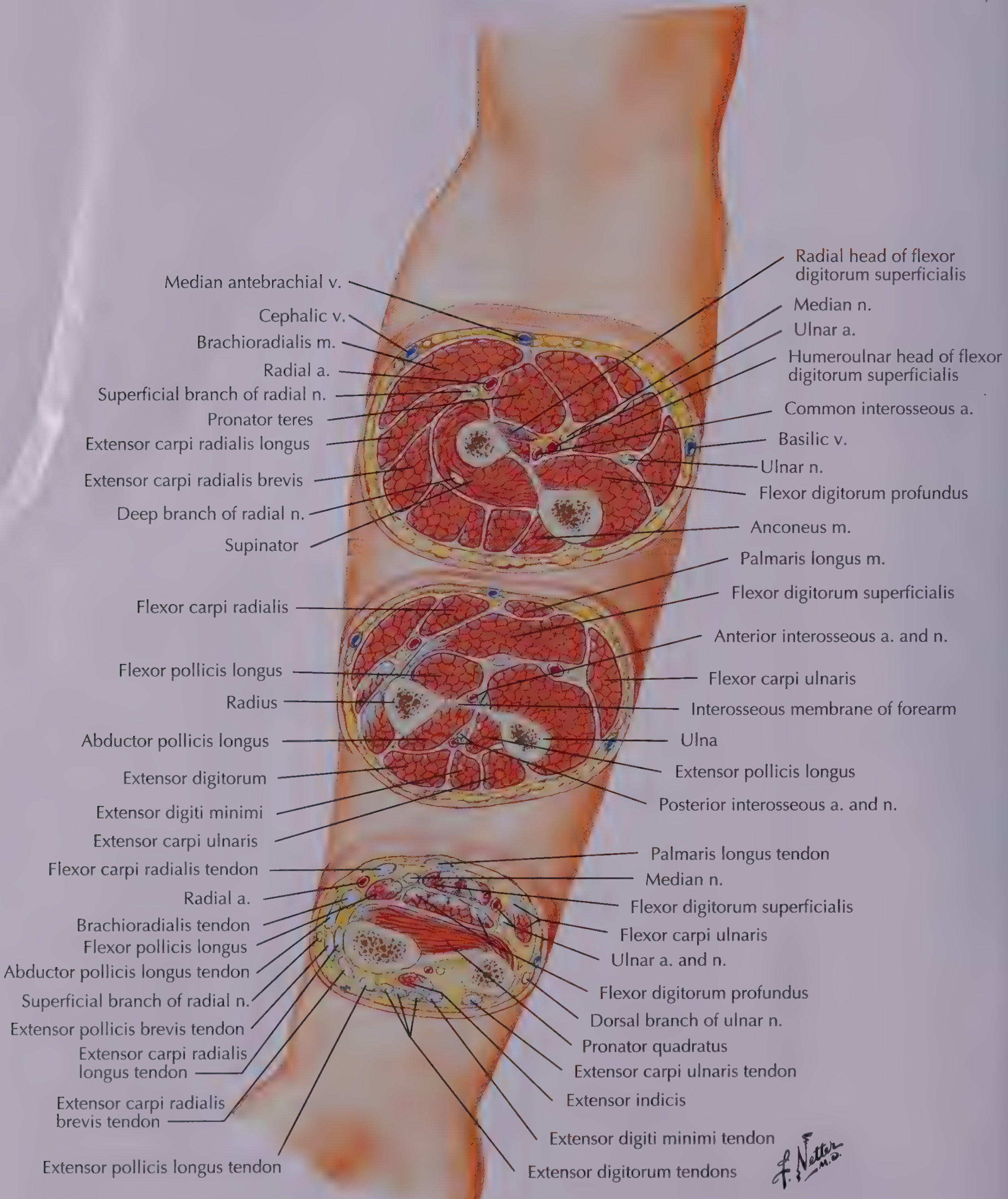
See also Plate 451

Note: Attachments of intrinsic muscles of hand not shown.


Medial head of triceps brachii m.
Triceps brachii m.
Humeral head of flexor carpi ulnaris (via common flexor tendon)
Supinator
Anconeus m.
Ulnar head of flexor carpi ulnaris
Biceps brachii m.
Supinator
Flexor digitorum profundus
Abductor pollicis longus
Ulnar head of extensor carpi ulnaris
Pronator teres
Extensor pollicis longus
Extensor pollicis brevis
Extensor indicis
Ulna
Radius
Extensor carpi radialis longus
Brachioradialis m.
Extensor carpi radialis brevis
Abductor pollicis longus
Extensor carpi ulnaris
Extensor pollicis brevis
Extensor digitorum (central bands)
Extensor pollicis longus
Extensor digiti minimi
Extensor indicis
Extensor digitorum (lateral bands)

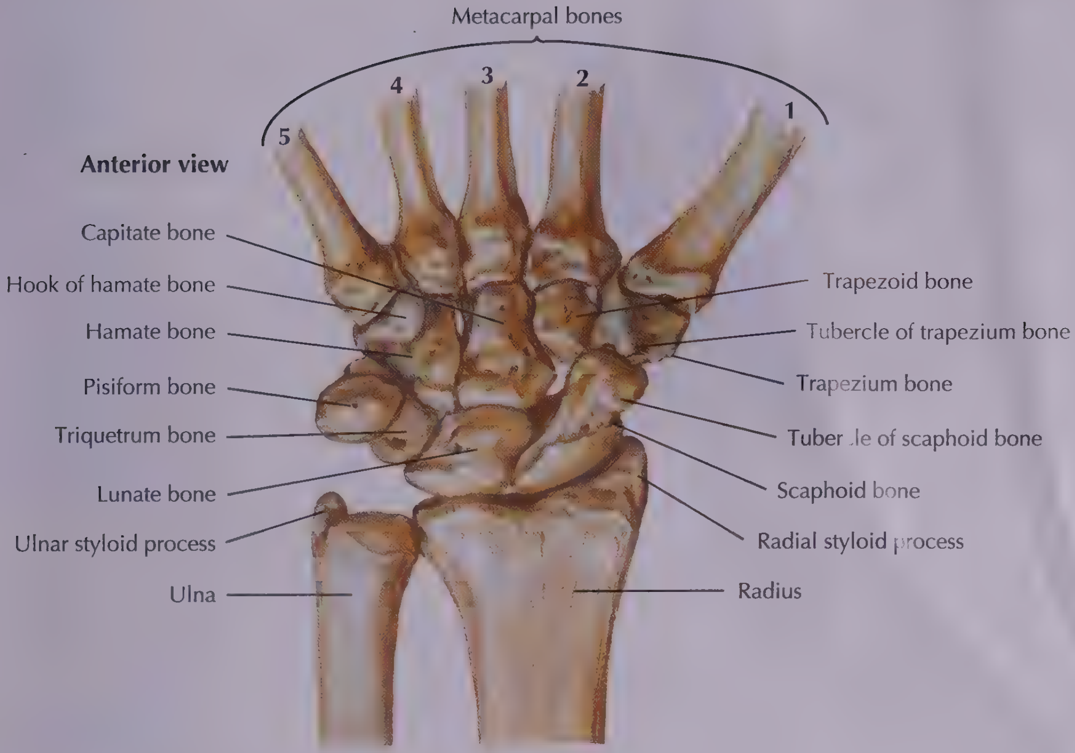
🟥 **Proximal muscle attachments**

🟦 **Distal muscle attachments**


Median antebrachial v.
Cephalic v.
Brachioradialis m.
Radial a.
Superficial branch of radial n.
Pronator teres
Extensor carpi radialis longus
Extensor carpi radialis brevis
Deep branch of radial n.
Supinator
Radial head of flexor digitorum superficialis
Median n.
Ulnar a.
Humeroulnar head of flexor digitorum superficialis
Common interosseous a.
Basilic v.
Ulnar n.
Flexor digitorum profundus
Anconeus m.
Flexor carpi radialis
Flexor pollicis longus
Radius
Abductor pollicis longus
Extensor digitorum
Extensor digiti minimi
Extensor carpi ulnaris
Palmaris longus m.
Flexor digitorum superficialis
Anterior interosseous a. and n.
Flexor carpi ulnaris
Interosseous membrane of forearm
Ulna
Extensor pollicis longus
Posterior interosseous a. and n.
Flexor carpi radialis tendon
Radial a.
Brachioradialis tendon
Flexor pollicis longus
Abductor pollicis longus tendon
Superficial branch of radial n.
Extensor pollicis brevis tendon
Extensor carpi radialis longus tendon
Extensor carpi radialis brevis tendon
Extensor pollicis longus tendon
Palmaris longus tendon
Median n.
Flexor digitorum superficialis
Flexor carpi ulnaris
Ulnar a. and n.
Flexor digitorum profundus
Dorsal branch of ulnar n.
Pronator quadratus
Extensor carpi ulnaris tendon
Extensor indicis
Extensor digiti minimi tendon
Extensor digitorum tendons
F. Netter M.D.

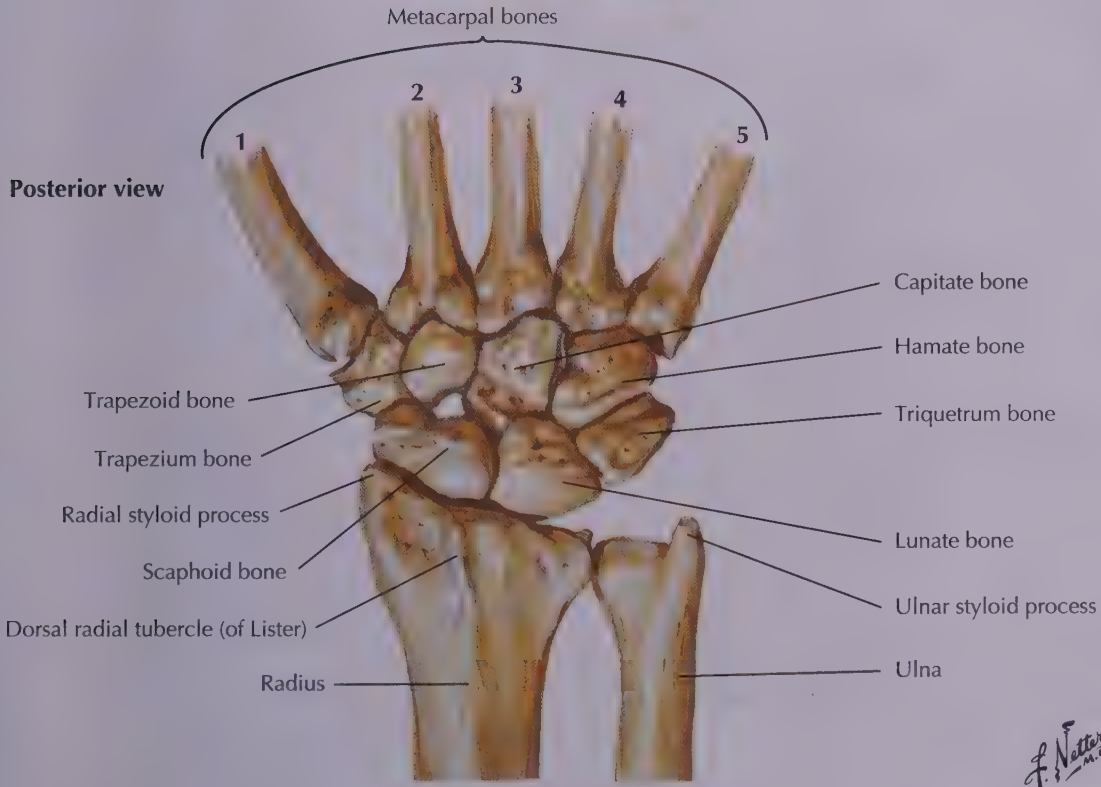
Carpal Bones

See also Plate 467



Anterior view

Metacarpal bones
5
4
3
2
1
Capitate bone
Hook of hamate bone
Hamate bone
Pisiform bone
Triquetrum bone
Lunate bone
Ulnar styloid process
Ulna
Trapezoid bone
Tubercle of trapezium bone
Trapezium bone
Tubercle of scaphoid bone
Scaphoid bone
Radial styloid process
Radius

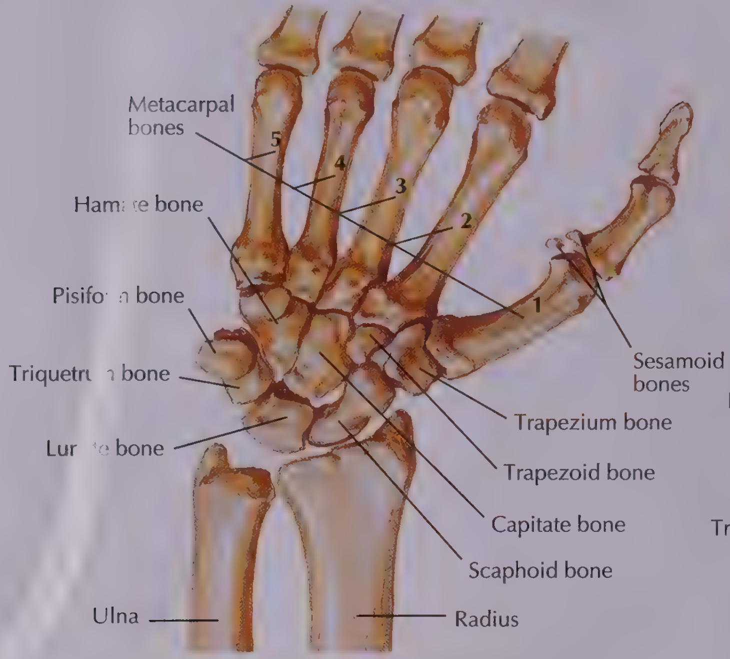


Posterior view

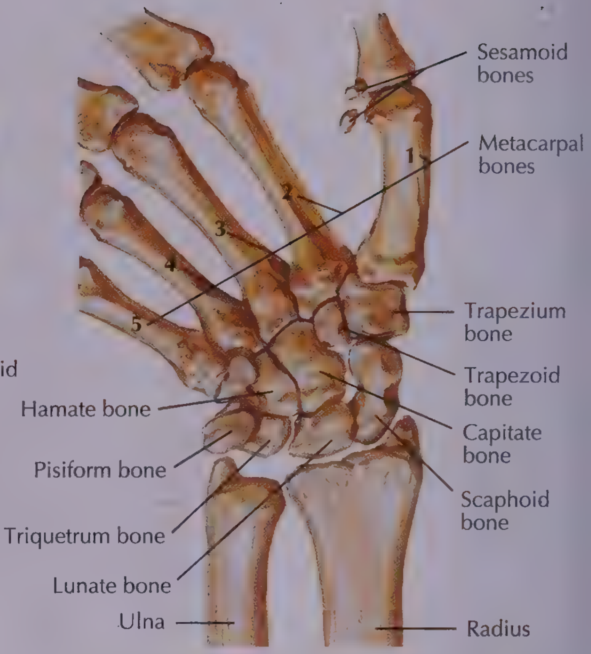
Metacarpal bones
1
2
3
4
5
Trapezoid bone
Trapezium bone
Radial styloid process
Scaphoid bone
Dorsal radial tubercle (of Lister)
Radius
Capitate bone
Hamate bone
Triquetrum bone
Lunate bone
Ulnar styloid process
Ulna

Movements of Wrist

See also Plates 466, 467

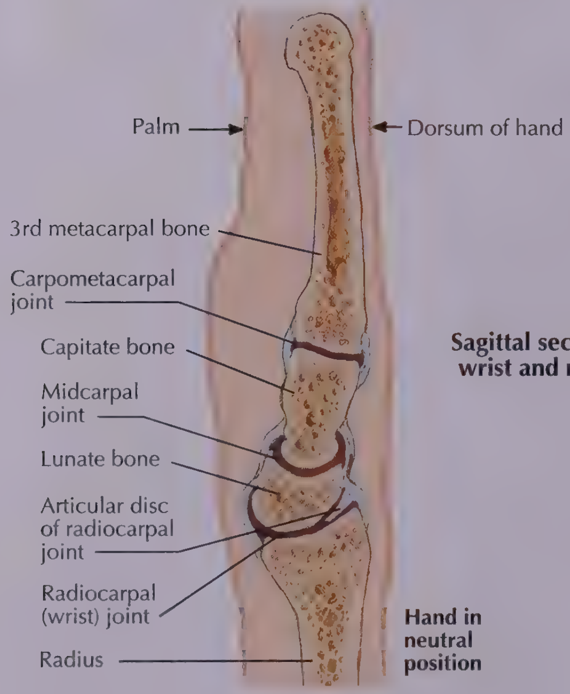

Metacarpal bones
5
4
3
2
1
Hamate bone
Pisiform bone
Triquetrum bone
Lunate bone
Sesamoid bones
Trapezium bone
Trapezoid bone
Capitate bone
Scaphoid bone
Ulna
Radius

Position of carpal bones with hand abducted anterior view

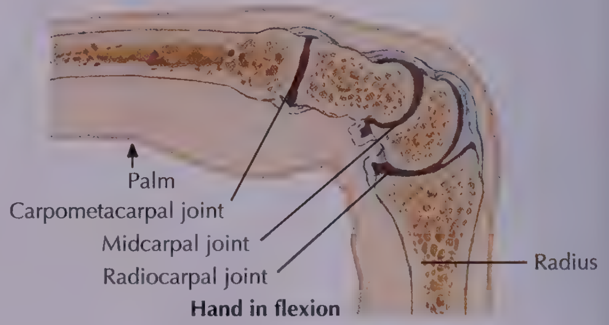

Sesamoid bones
Metacarpal bones
1
2
3
4
5
Trapezium bone
Trapezoid bone
Capitate bone
Scaphoid bone
Hamate bone
Pisiform bone
Triquetrum bone
Lunate bone
Ulna
Radius

Position of carpal bones with hand adducted anterior view

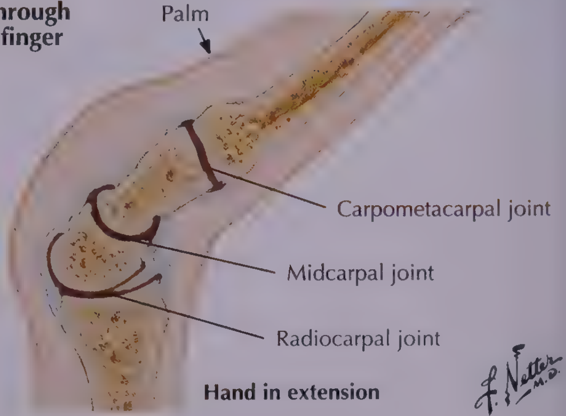
Sagittal sections through wrist and middle finger


Palm
Dorsum of hand
3rd metacarpal bone
Carpometacarpal joint
Capitate bone
Midcarpal joint
Lunate bone
Articular disc of radiocarpal joint
Radiocarpal (wrist) joint
Radius

Hand in neutral position

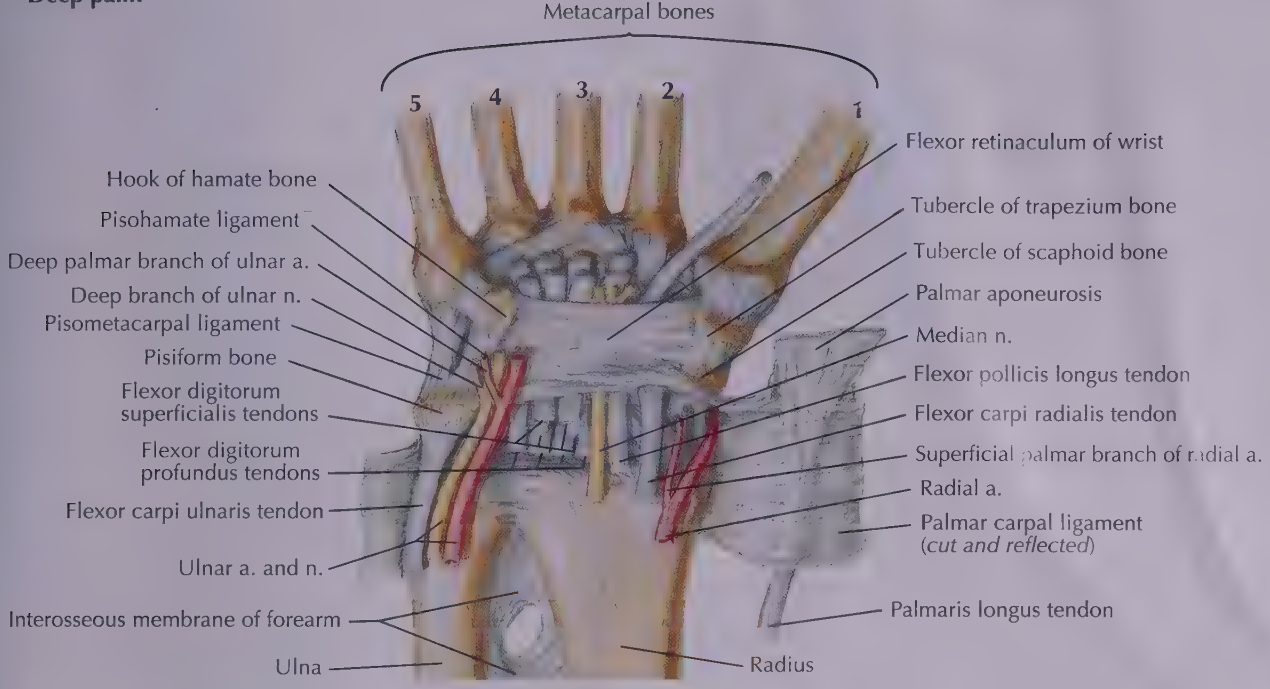

Palm
Carpometacarpal joint
Midcarpal joint
Radiocarpal joint
Radius

Hand in flexion

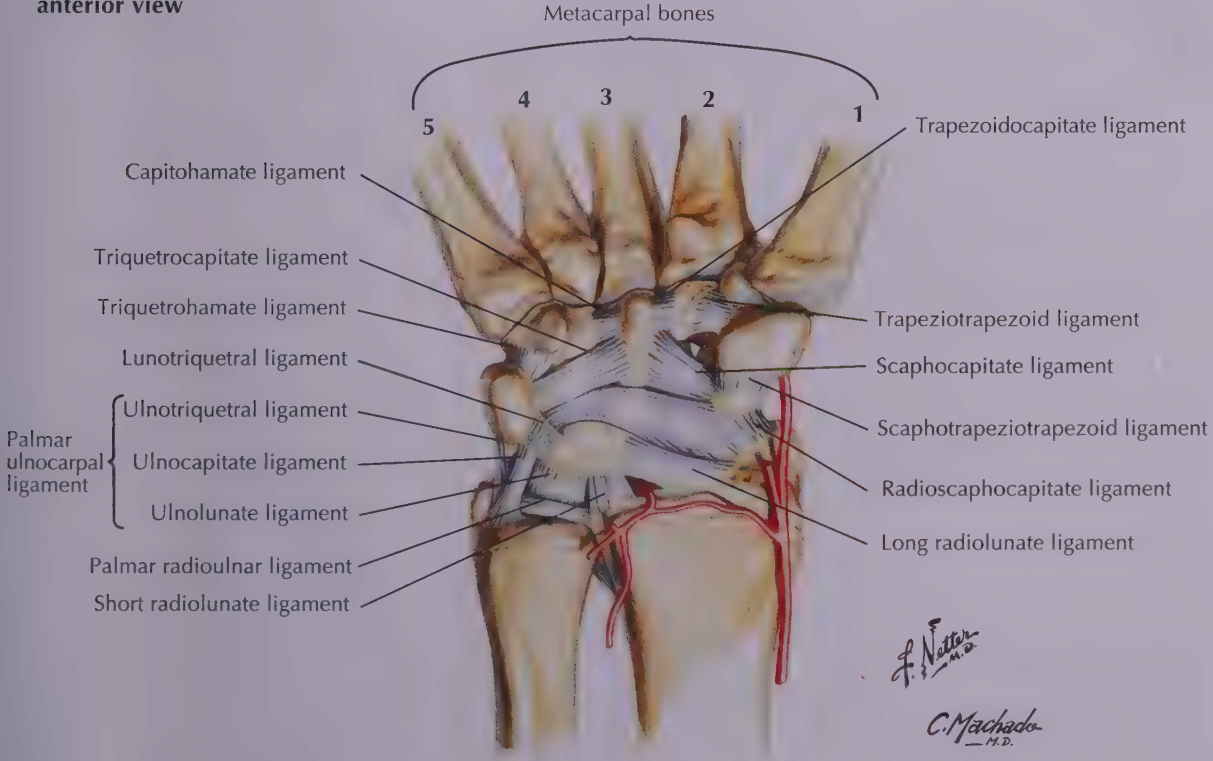

Palm
Carpometacarpal joint
Midcarpal joint
Radiocarpal joint

Hand in extension

Deep palm


Metacarpal bones
5
4
3
2
1
Hook of hamate bone
Pisohamate ligament
Deep palmar branch of ulnar a.
Deep branch of ulnar n.
Pisometacarpal ligament
Pisiform bone
Flexor digitorum superficialis tendons
Flexor digitorum profundus tendons
Flexor carpi ulnaris tendon
Ulnar a. and n.
Interosseous membrane of forearm
Ulna
Flexor retinaculum of wrist
Tubercle of trapezium bone
Tubercle of scaphoid bone
Palmar aponeurosis
Median n.
Flexor pollicis longus tendon
Flexor carpi radialis tendon
Superficial palmar branch of radial a.
Radial a.
Palmar carpal ligament (*cut and reflected*)
Palmaris longus tendon
Radius

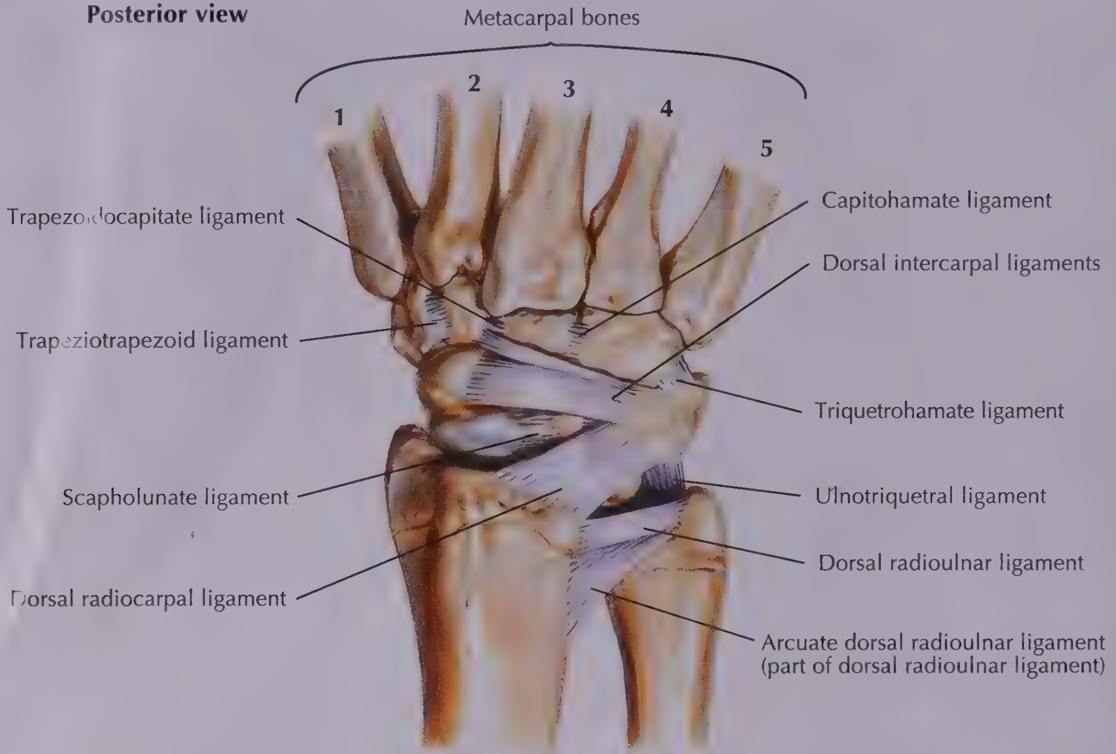
Flexor retinaculum of wrist removed: anterior view


Metacarpal bones
5
4
3
2
1
Capitohamate ligament
Triquetrocapitate ligament
Triquetrohamate ligament
Lunotriquetral ligament
Palmar ulnocarpal ligament
Ulnotriquetral ligament
Ulnocapitate ligament
Ulnolunate ligament
Palmar radioulnar ligament
Short radiolunate ligament
Trapezoidocapitate ligament
Trapeziotrapezoid ligament
Scaphocapitate ligament
Scaphotrapeziotrapezoid ligament
Radioscaphocapitate ligament
Long radiolunate ligament
F. Netter M.D.
C. Machado M.D.

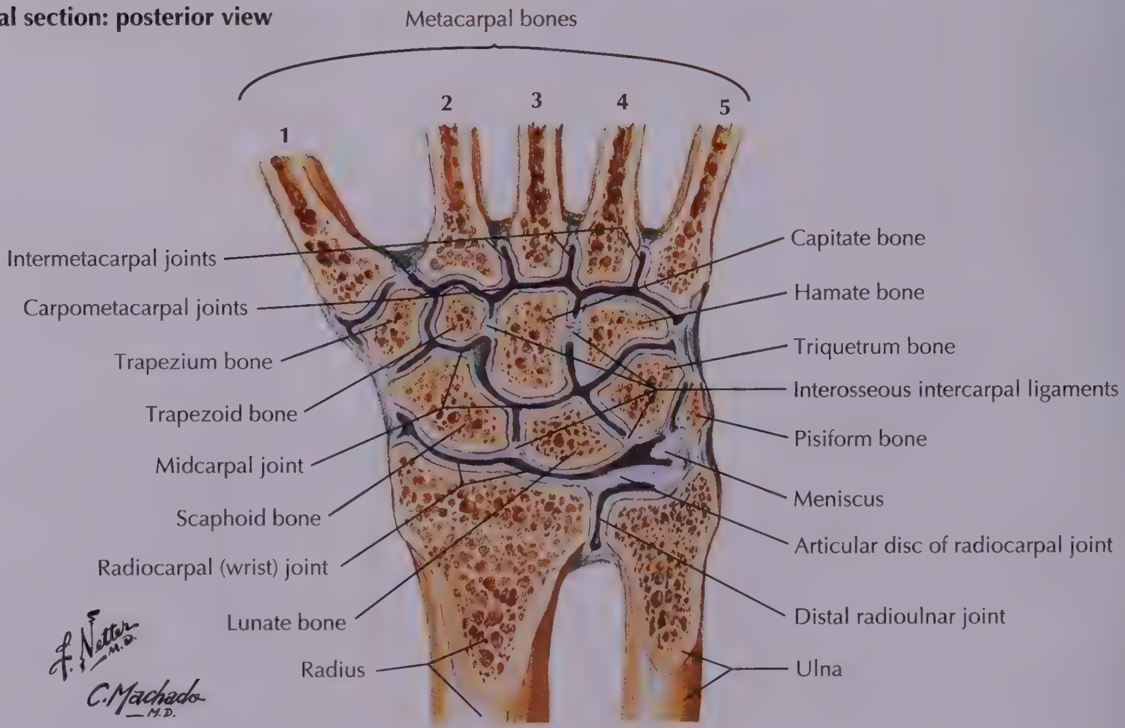
Ligaments of Wrist: Posterior View

See also Plates 467, BP 98

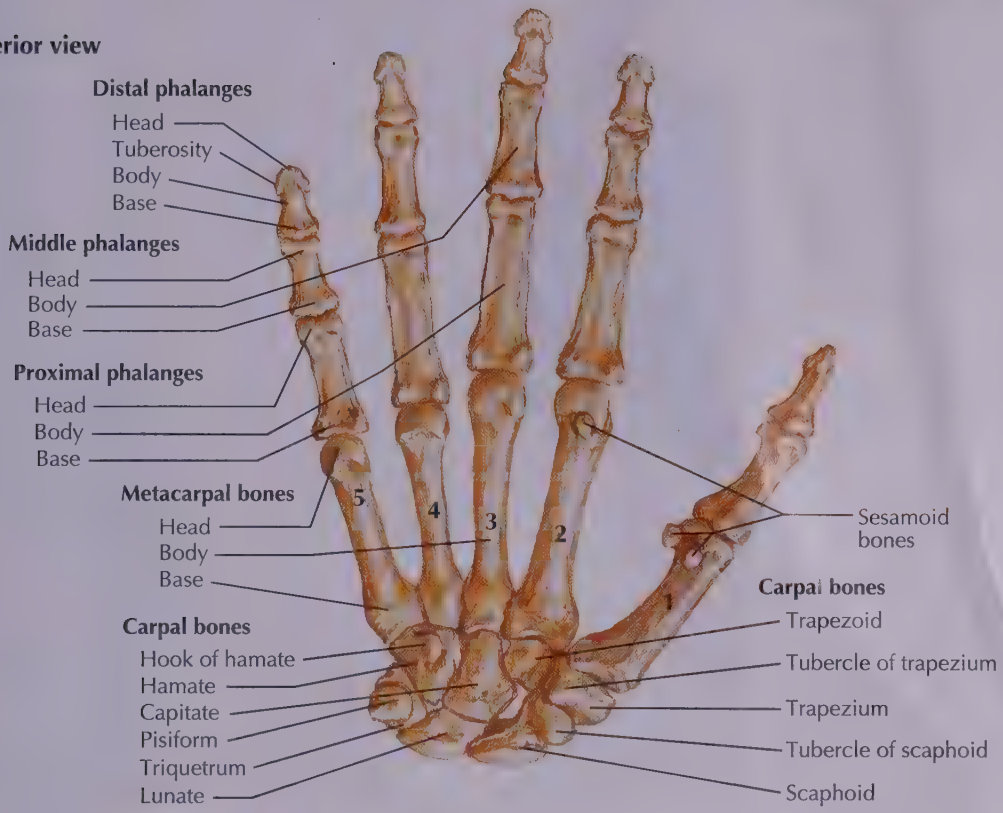
Posterior view


Metacarpal bones
1
2
3
4
5
Trapezoidocapitate ligament
Trapeziotrapezoid ligament
Scapholunate ligament
Dorsal radiocarpal ligament
Capitohamate ligament
Dorsal intercarpal ligaments
Triquetrohamate ligament
Ulnotriquetral ligament
Dorsal radioulnar ligament
Arcuate dorsal radioulnar ligament (part of dorsal radioulnar ligament)

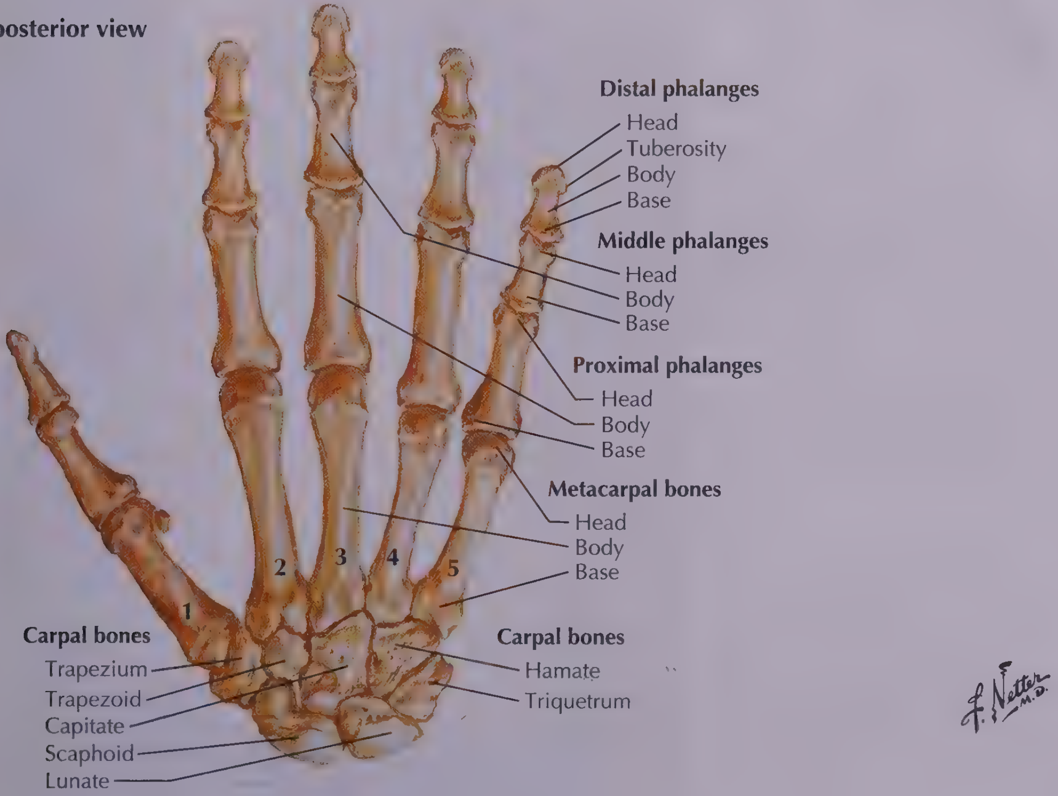
Coronal section: posterior view


Metacarpal bones
1
2
3
4
5
Intermetacarpal joints
Carpometacarpal joints
Trapezium bone
Trapezoid bone
Midcarpal joint
Scaphoid bone
Radiocarpal (wrist) joint
Lunate bone
Radius
Capitate bone
Hamate bone
Triquetrum bone
Interosseous intercarpal ligaments
Pisiform bone
Meniscus
Articular disc of radiocarpal joint
Distal radioulnar joint
Ulna

Right hand: anterior view


Distal phalanges
Head
Tuberosity
Body
Base
Middle phalanges
Head
Body
Base
Proximal phalanges
Head
Body
Base
Metacarpal bones
Head
Body
Base
5
4
3
2
1
Carpal bones
Hook of hamate
Hamate
Capitate
Pisiform
Triquetrum
Lunate
Sesamoid bones
Carpal bones
Trapezoid
Tubercle of trapezium
Trapezium
Tubercle of scaphoid
Scaphoid

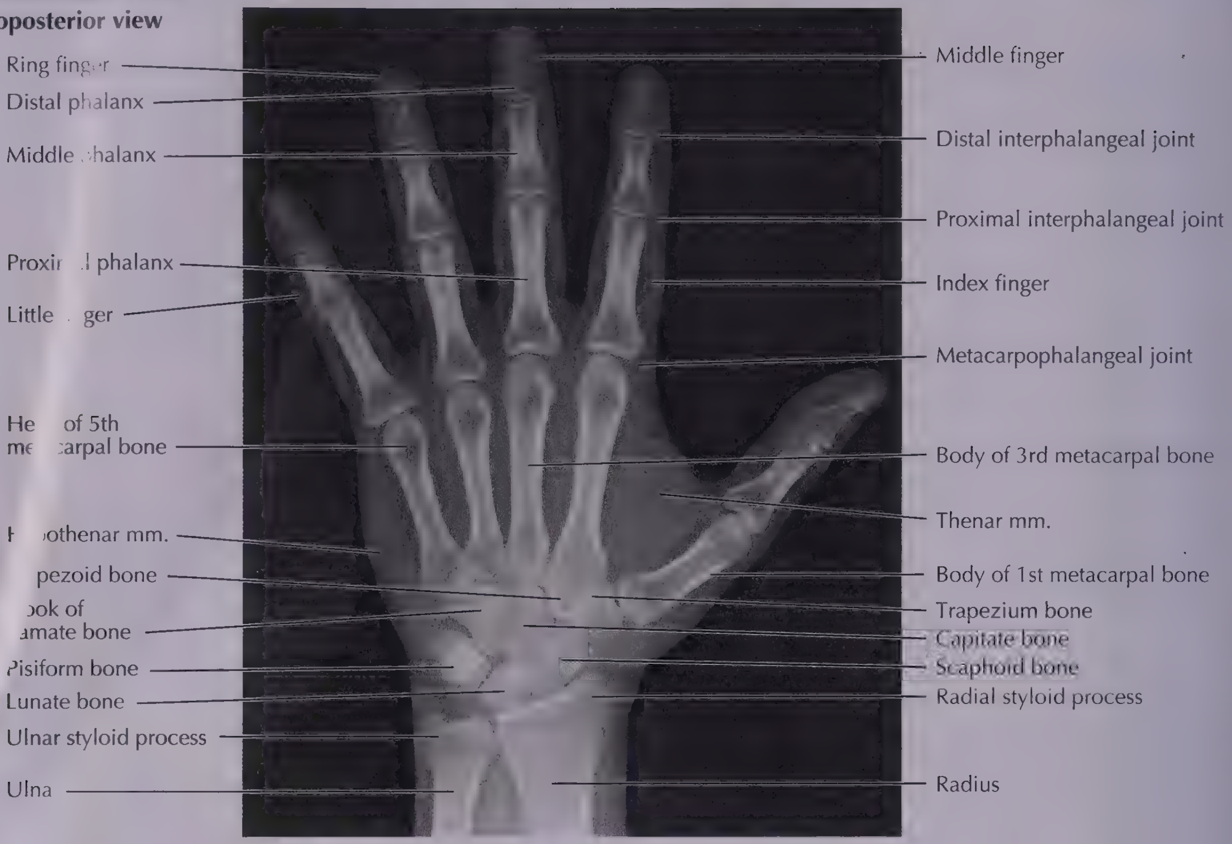
Right hand: posterior view


Distal phalanges
Head
Tuberosity
Body
Base
Middle phalanges
Head
Body
Base
Proximal phalanges
Head
Body
Base
Metacarpal bones
Head
Body
Base
1
2
3
4
5
Carpal bones
Trapezium
Trapezoid
Capitate
Scaphoid
Lunate
Carpal bones
Hamate
Triquetrum
F. Netter M.D.

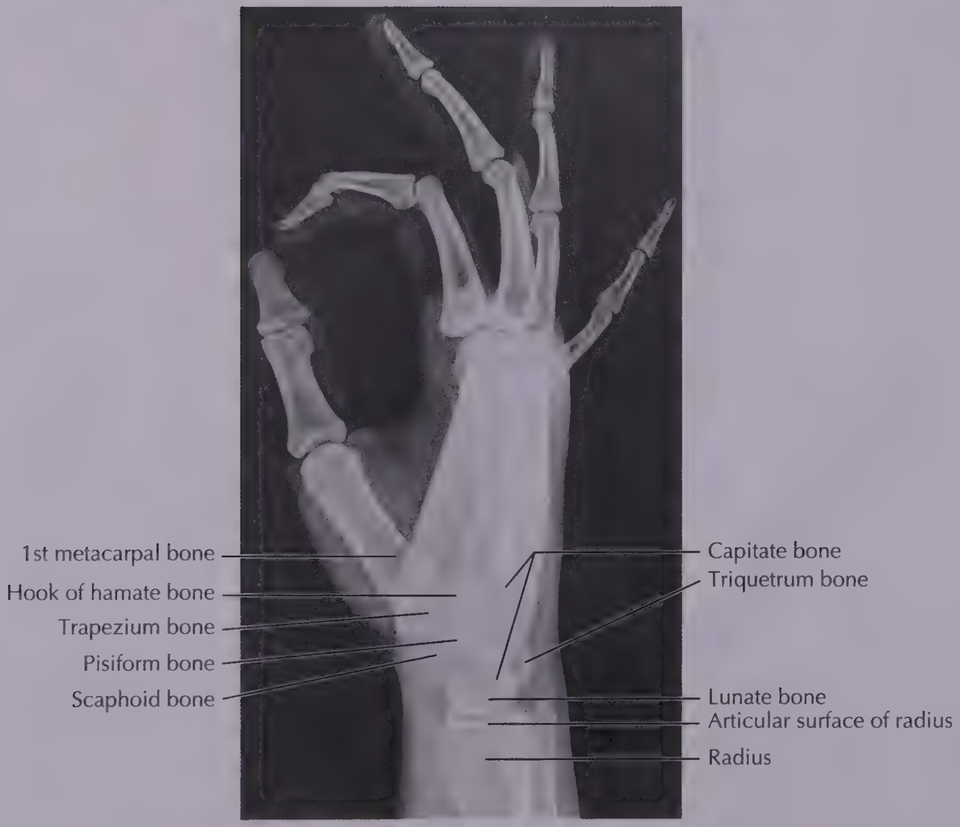
Wrist and Hand: Radiographs

See also Plate 466

Anteroposterior view

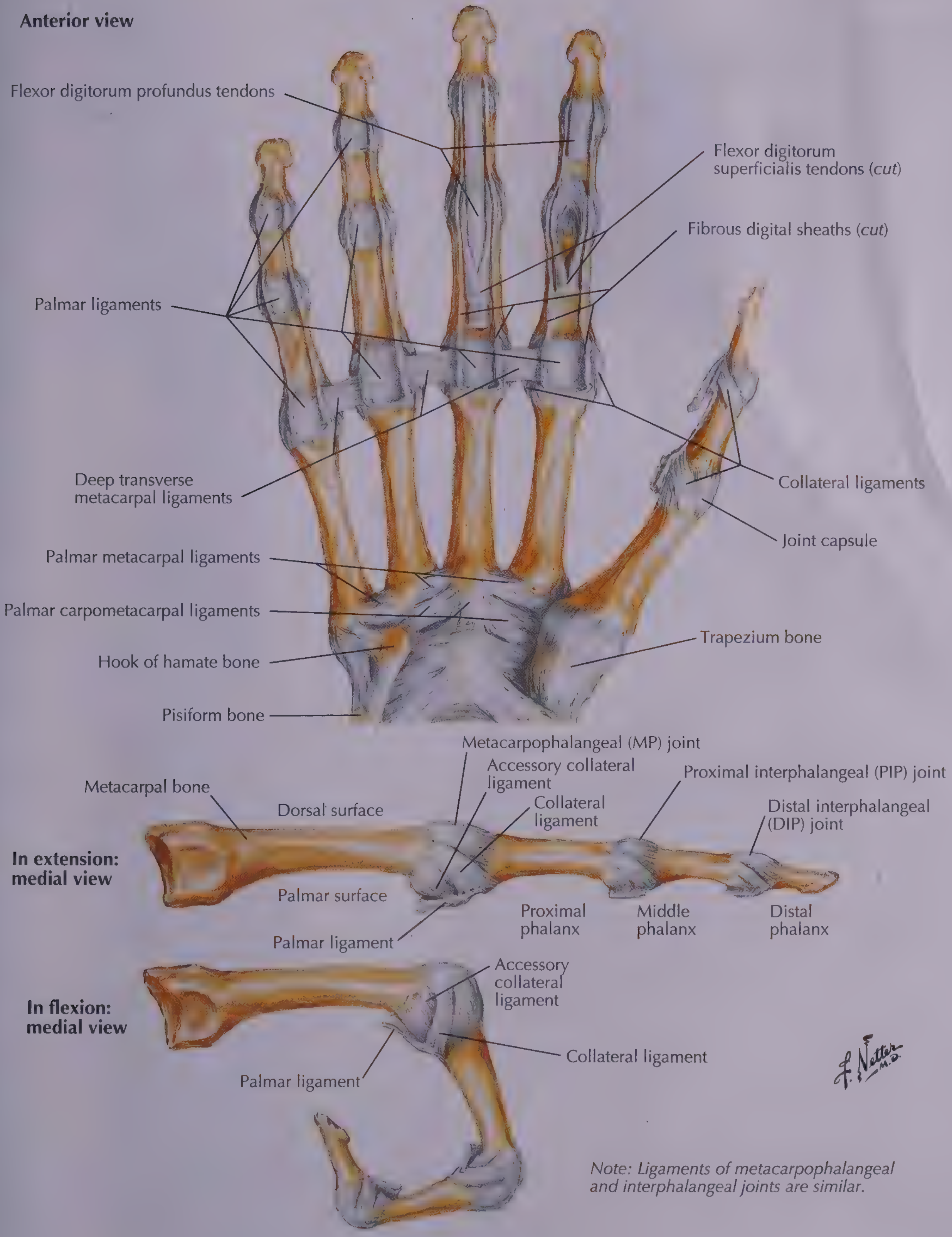

Ring finger
Distal phalanx
Middle phalanx
Proximal phalanx
Little finger
Head of 5th metacarpal bone
Hypothenar mm.
Trapezoid bone
Hook of hamate bone
Pisiform bone
Lunate bone
Ulnar styloid process
Ulna
Middle finger
Distal interphalangeal joint
Proximal interphalangeal joint
Index finger
Metacarpophalangeal joint
Body of 3rd metacarpal bone
Thenar mm.
Body of 1st metacarpal bone
Trapezium bone
Capitate bone
Scaphoid bone
Radial styloid process
Radius

Lateral view


1st metacarpal bone
Hook of hamate bone
Trapezium bone
Pisiform bone
Scaphoid bone
Capitate bone
Triquetrum bone
Lunate bone
Articular surface of radius
Radius

Metacarpophalangeal and Interphalangeal Ligaments

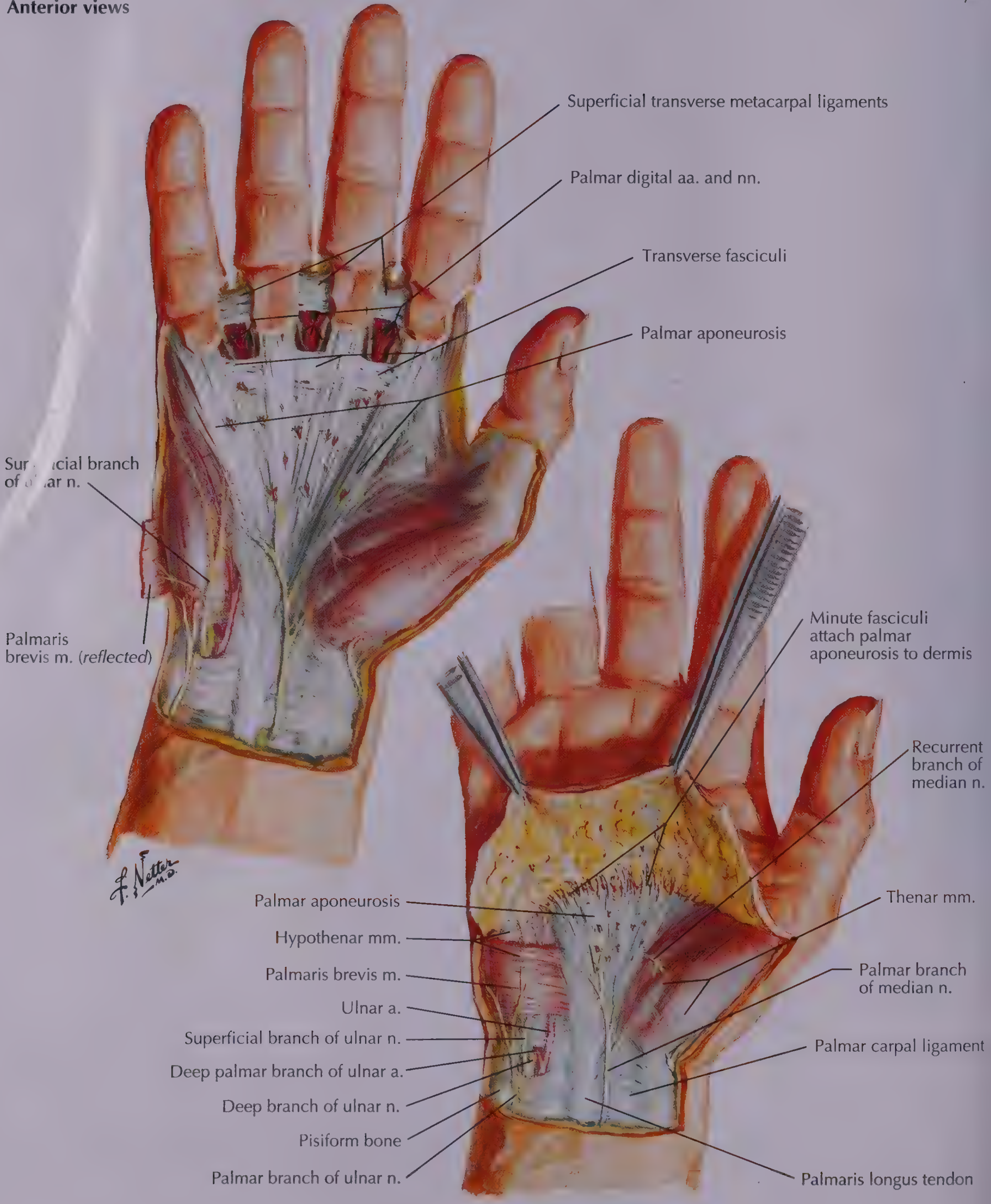
See also Plate 471

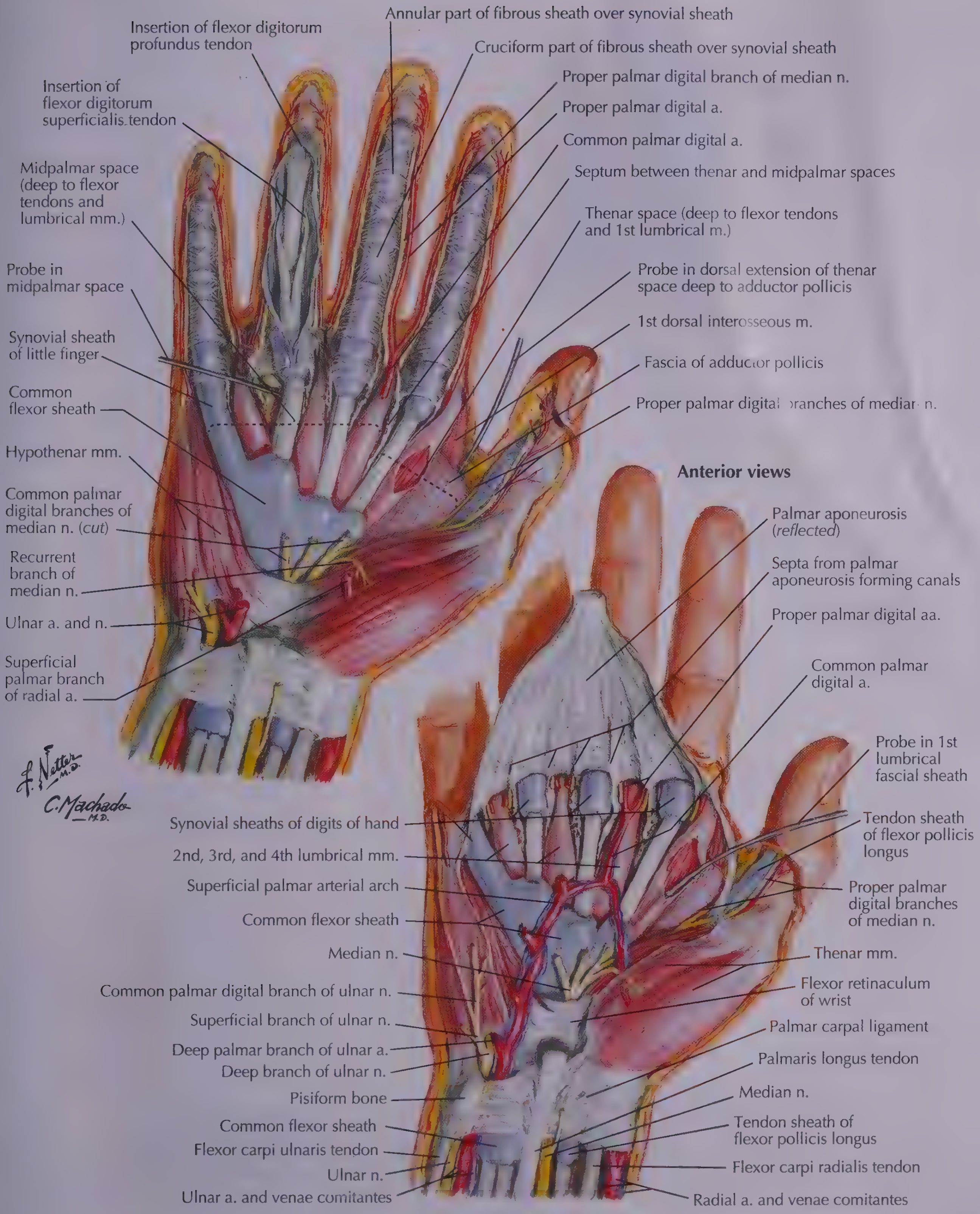

Anterior view
Flexor digitorum profundus tendons
Flexor digitorum superficialis tendons (*cut*)
Fibrous digital sheaths (*cut*)
Palmar ligaments
Collateral ligaments
Deep transverse metacarpal ligaments
Joint capsule
Palmar metacarpal ligaments
Palmar carpometacarpal ligaments
Trapezium bone
Hook of hamate bone
Pisiform bone
Metacarpophalangeal (MP) joint
Accessory collateral ligament
Proximal interphalangeal (PIP) joint
Metacarpal bone
Collateral ligament
Distal interphalangeal (DIP) joint
Dorsal surface
In extension: medial view
Palmar surface
Proximal phalanx
Middle phalanx
Distal phalanx
Palmar ligament
Accessory collateral ligament
In flexion: medial view
Collateral ligament
Palmar ligament

Note: Ligaments of metacarpophalangeal and interphalangeal joints are similar.

See also Plate 482

Anterior views


Superficial transverse metacarpal ligaments
Palmar digital aa. and nn.
Transverse fasciculi
Palmar aponeurosis
Superficial branch of ulnar n.
Palmaris brevis m. (reflected)
F. Netter M.D.
Minute fasciculi attach palmar aponeurosis to dermis
Recurrent branch of median n.
Palmar aponeurosis
Thenar mm.
Hypothenar mm.
Palmaris brevis m.
Palmar branch of median n.
Ulnar a.
Superficial branch of ulnar n.
Palmar carpal ligament
Deep palmar branch of ulnar a.
Deep branch of ulnar n.
Pisiform bone
Palmar branch of ulnar n.
Palmaris longus tendon

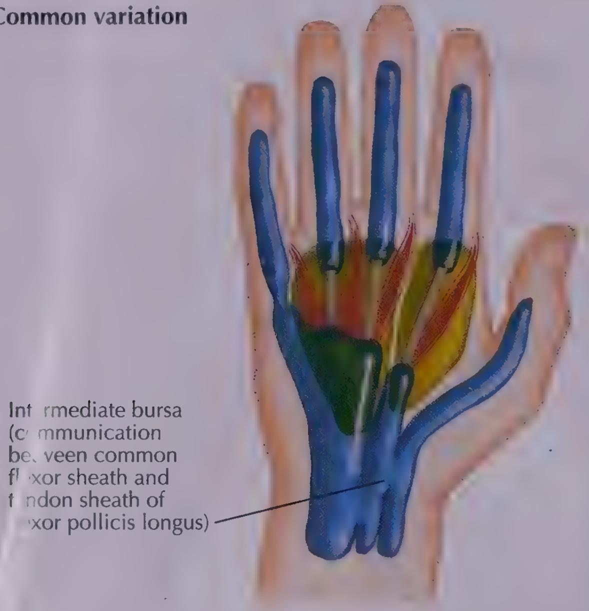


Anterior views

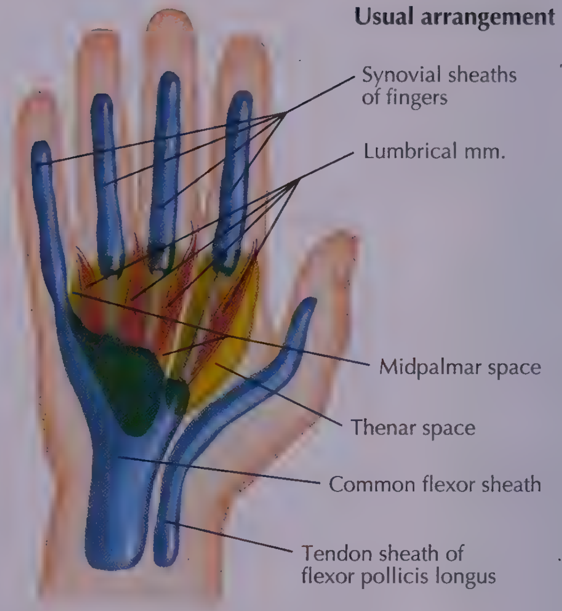
Annular part of fibrous sheath over synovial sheath
Insertion of flexor digitorum profundus tendon
Cruciform part of fibrous sheath over synovial sheath
Proper palmar digital branch of median n.
Insertion of flexor digitorum superficialis tendon
Proper palmar digital a.
Common palmar digital a.
Midpalmar space (deep to flexor tendons and lumbrical mm.)
Septum between thenar and midpalmar spaces
Thenar space (deep to flexor tendons and 1st lumbrical m.)
Probe in midpalmar space
Probe in dorsal extension of thenar space deep to adductor pollicis
1st dorsal interosseous m.
Synovial sheath of little finger
Fascia of adductor pollicis
Common flexor sheath
Proper palmar digital branches of median n.
Hypothenar mm.
Common palmar digital branches of median n. (cut)
Recurrent branch of median n.
Ulnar a. and n.
Superficial palmar branch of radial a.
F. Netter M.D.
C. Machado M.D.
Palmar aponeurosis (reflected)
Septa from palmar aponeurosis forming canals
Proper palmar digital aa.
Common palmar digital a.
Probe in 1st lumbrical fascial sheath
Synovial sheaths of digits of hand
Tendon sheath of flexor pollicis longus
2nd, 3rd, and 4th lumbrical mm.
Superficial palmar arterial arch
Proper palmar digital branches of median n.
Common flexor sheath
Median n.
Thenar mm.
Common palmar digital branch of ulnar n.
Flexor retinaculum of wrist
Superficial branch of ulnar n.
Palmar carpal ligament
Deep palmar branch of ulnar a.
Palmaris longus tendon
Deep branch of ulnar n.
Pisiform bone
Median n.
Common flexor sheath
Tendon sheath of flexor pollicis longus
Flexor carpi ulnaris tendon
Ulnar n.
Flexor carpi radialis tendon
Ulnar a. and venae comitantes
Radial a. and venae comitantes

Lumbrical Muscles, Midpalmar and Thenar Spaces, and Tendon Sheaths

See also Plate 468

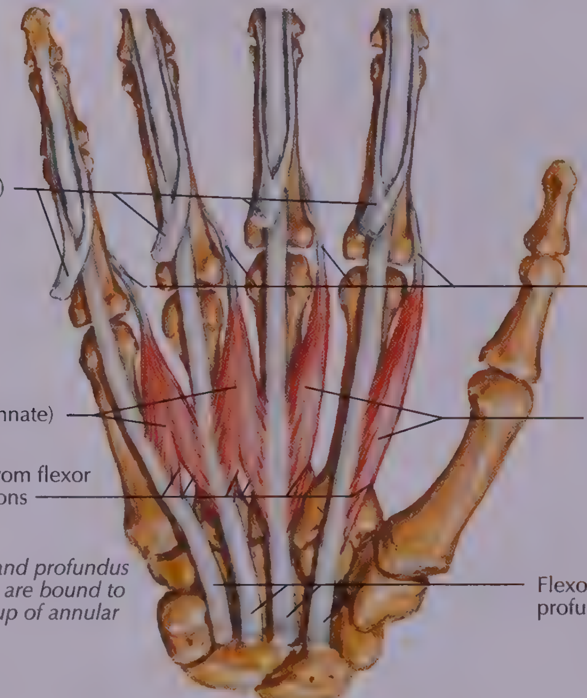

Common variation

Intermediate bursa (communication between common flexor sheath and tendon sheath of flexor pollicis longus)

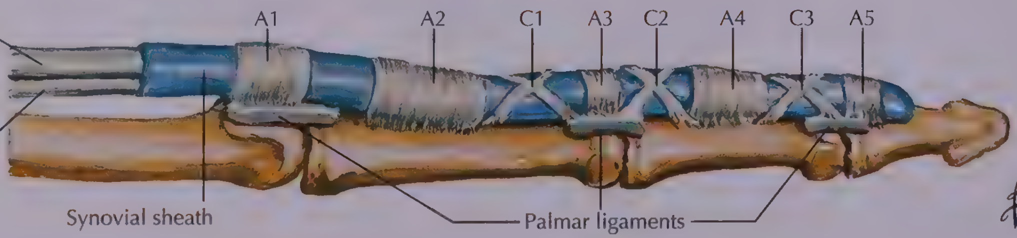

Usual arrangement

Synovial sheaths of fingers
Lumbrical mm.
Midpalmar space
Thenar space
Common flexor sheath
Tendon sheath of flexor pollicis longus

Lumbrical muscles: schema


Flexor digitorum superficialis tendons (*cut*)
Lumbrical tendons (insert into extensor expansion system)
3rd and 4th lumbrical mm. (bipennate)
1st and 2nd lumbrical mm. (unipennate)
Lumbrical muscles arise from flexor digitorum profundus tendons
Flexor digitorum profundus tendons

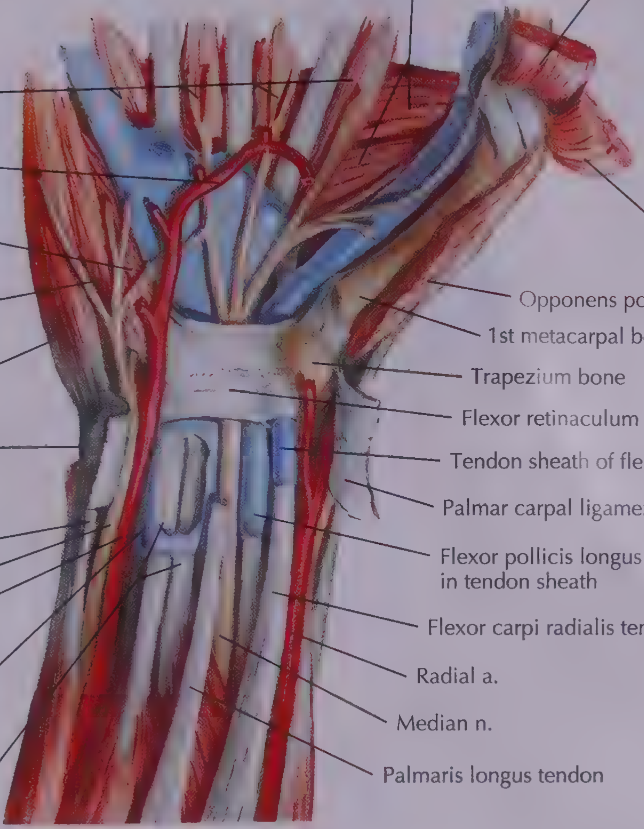
Note: Flexor digitorum superficialis and profundus tendons encased in synovial sheaths are bound to phalanges by fibrous sheaths made up of annular (A) and cruciform (C) parts.


Tendon of flexor digitorum superficialis
Tendon of flexor digitorum profundus
A1
A2
C1
A3
C2
A4
C3
A5
Synovial sheath
Palmar ligaments

Flexor Tendons, Arteries, and Nerves at Wrist

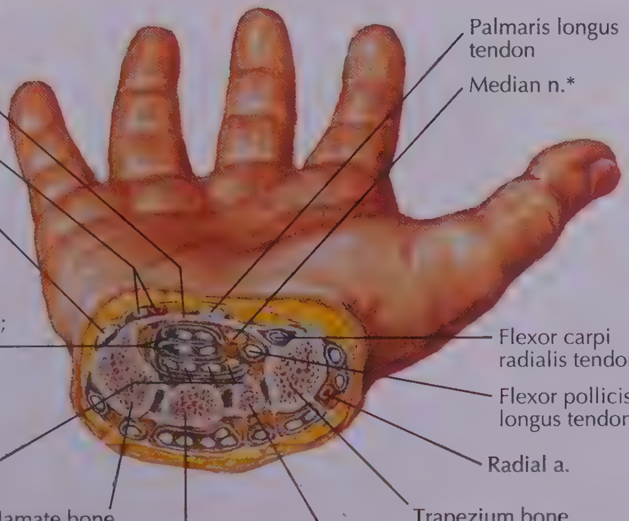
See also Plates 482, 483, BP 100

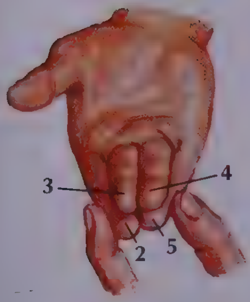
Anterior view


Adductor pollicis
Flexor pollicis brevis (*reflected*)
Lumbrical mm.
Superficial palmar arch
Abductor pollicis brevis (*reflected*)
Opponens digiti minimi m.
Flexor digiti minimi
Opponens pollicis m. (*cut*)
1st metacarpal bone
Abductor digiti minimi
Trapezium bone
Flexor retinaculum of wrist
Pisiform bone
Tendon sheath of flexor carpi radialis
Palmar carpal ligament (*reflected*)
Flexor carpi ulnaris tendon
Ulnar n.
Ulnar a.
Flexor pollicis longus tendon in tendon sheath
Flexor carpi radialis tendon
Radial a.
Common flexor sheath
Median n.
Palmaris longus tendon
Flexor digitorum superficialis tendons

F. Netter M.D.

Cross section of wrist demonstrating carpal tunnel


Flexor retinaculum of wrist
Ulnar a. and n.
Flexor carpi ulnaris tendon
Flexor digitorum superficialis tendons* (3, 4 superficial; 2, 5 deep)
Flexor digitorum profundus tendons* (2, 3, 4, 5)
Hamate bone
Capitate bone
Palmaris longus tendon
Median n.*
Flexor carpi radialis tendon
Flexor pollicis longus tendon*
Radial a.
Trapezium bone
Trapezoid bone

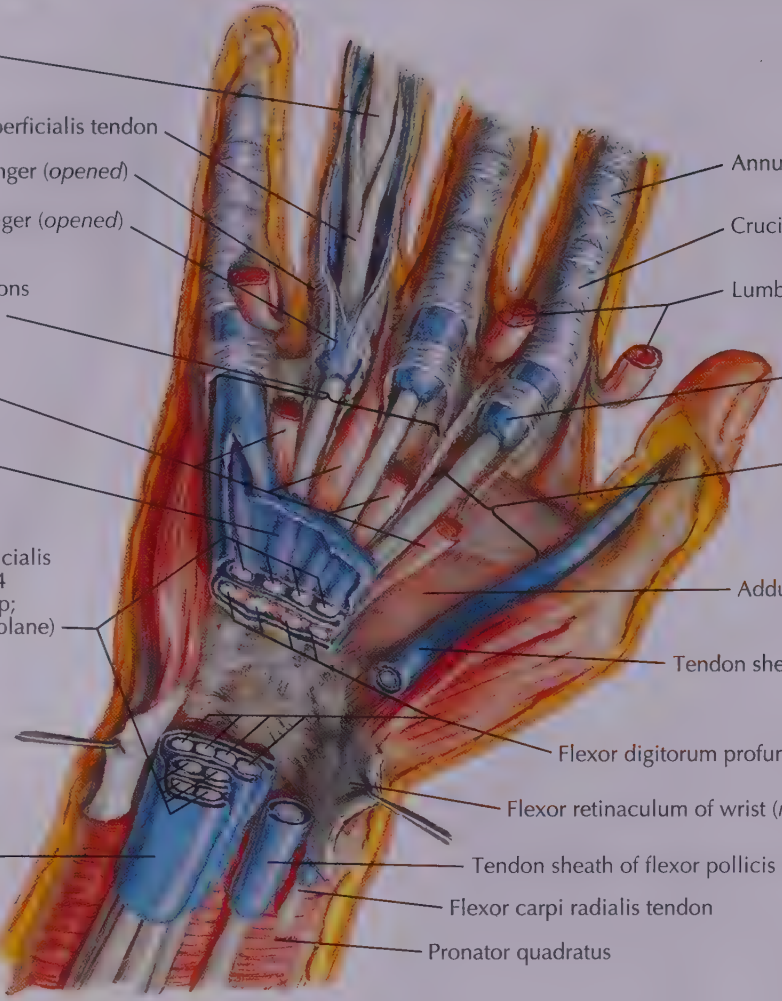


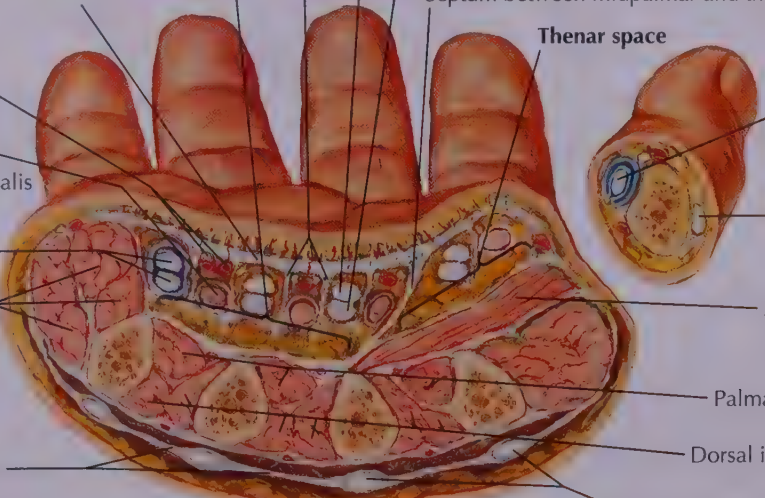
Simple method of demonstrating arrangement of flexor digitorum superficialis tendons within carpal tunnel

*Contents of carpal tunnel

Spaces and Tendon Sheaths of Hand

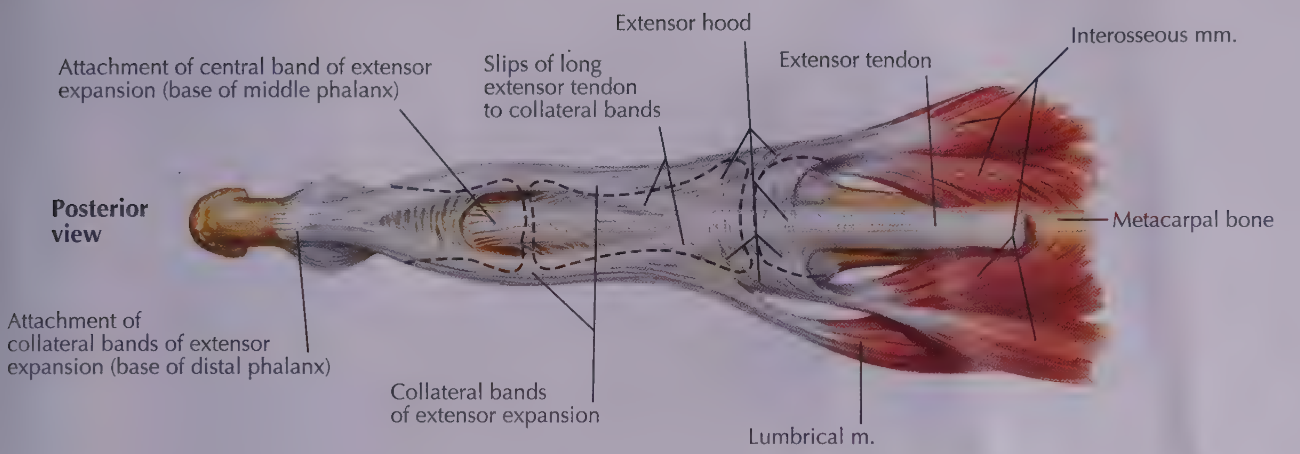
See also Plate BP 100

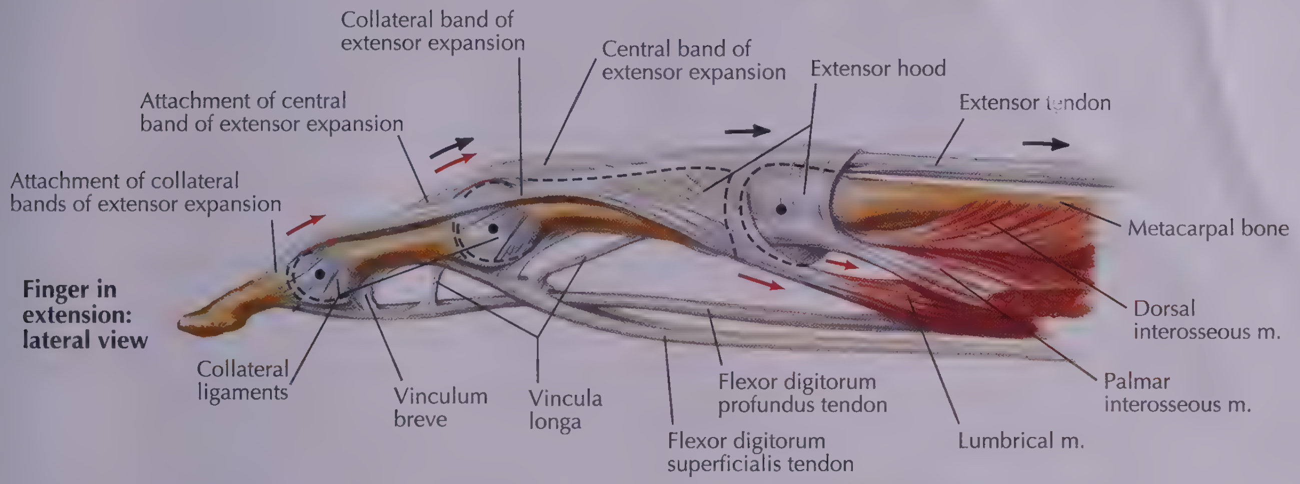

Flexor digitorum profundus tendon
Flexor digitorum superficialis tendon
Fibrous sheath of finger (*opened*)
Synovial sheath of finger (*opened*)
Midpalmar space (deep to flexor tendons and lumbrical mm.)
Lumbrical mm.
Common flexor sheath (*opened*)
Flexor digitorum superficialis tendons (proximally 3, 4 superficial and 2, 5 deep; distally 2, 3, 4, 5 same plane)
Common flexor sheath
Annular part of fibrous sheath
Cruciform part of fibrous sheath
Lumbrical mm. (*cut and reflected*)
Synovial sheath of finger
Thenar space (deep to flexor tendon and 1st lumbrical m.)
Adductor pollicis
Tendon sheath of flexor pollicis longus
Flexor digitorum profundus tendons (2, 3, 4, 5)
Flexor retinaculum of wrist (*reflected*)
Tendon sheath of flexor pollicis longus
Flexor carpi radialis tendon
Pronator quadratus
F. Netter M.D.
C. Machado M.D.

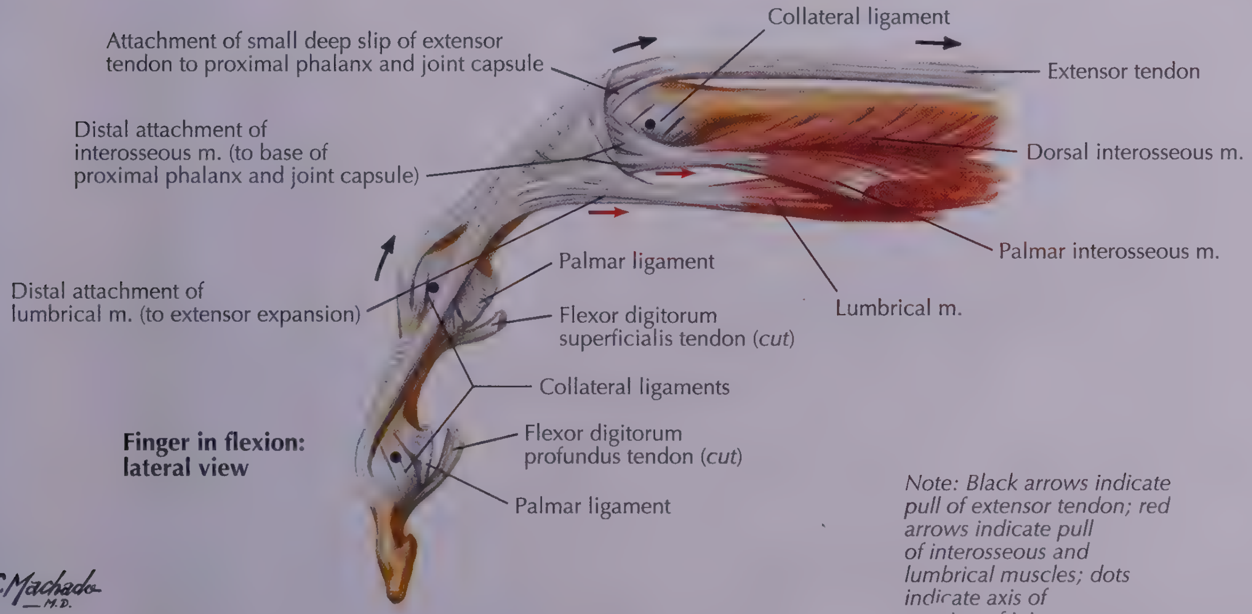

Midpalmar space
Palmar aponeurosis
Common palmar digital a. and n.
Lumbrical m.
Flexor digitorum superficialis and profundus tendons (to 5th digit in synovial sheath)
Hypothenar mm.
Dorsal fascia of hand
Septa forming canals
Flexor digitorum profundus tendon (to 3rd digit)
Flexor digitorum superficialis tendon (to 3rd digit)
Septum between midpalmar and thenar spaces
Thenar space
Flexor pollicis longus tendon
Extensor pollicis longus tendon
Adductor pollicis
Palmar interosseous mm.
Dorsal interosseous mm.
Extensor tendons

Flexor and Extensor Tendons in Fingers

See also Plate 475

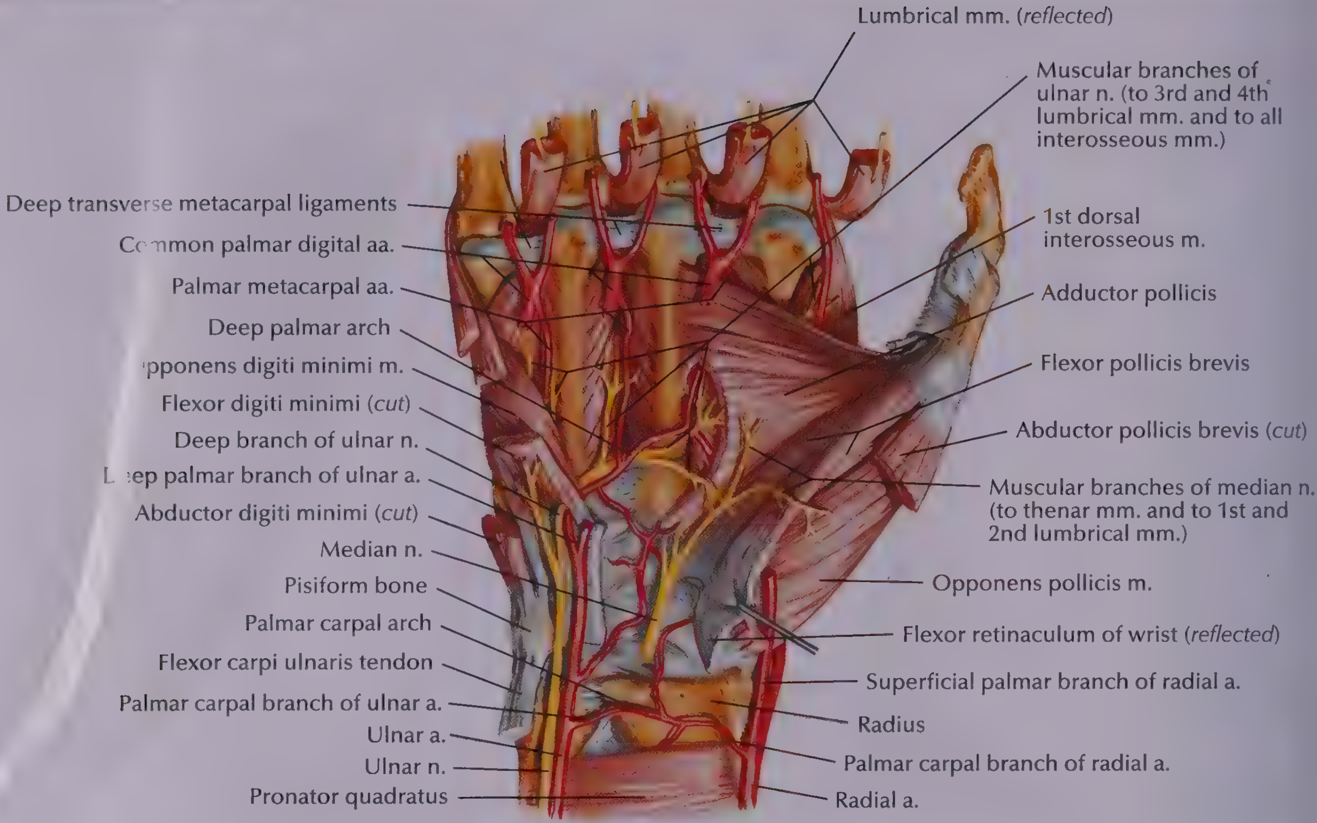

Posterior view
Extensor hood
Attachment of central band of extensor expansion (base of middle phalanx)
Slips of long extensor tendon to collateral bands
Extensor tendon
Interosseous mm.
Metacarpal bone
Attachment of collateral bands of extensor expansion (base of distal phalanx)
Collateral bands of extensor expansion
Lumbrical m.


Finger in extension: lateral view
Collateral band of extensor expansion
Central band of extensor expansion
Extensor hood
Extensor tendon
Attachment of central band of extensor expansion
Attachment of collateral bands of extensor expansion
Metacarpal bone
Dorsal interosseous m.
Palmar interosseous m.
Collateral ligaments
Vinculum breve
Vincula longa
Flexor digitorum profundus tendon
Flexor digitorum superficialis tendon
Lumbrical m.

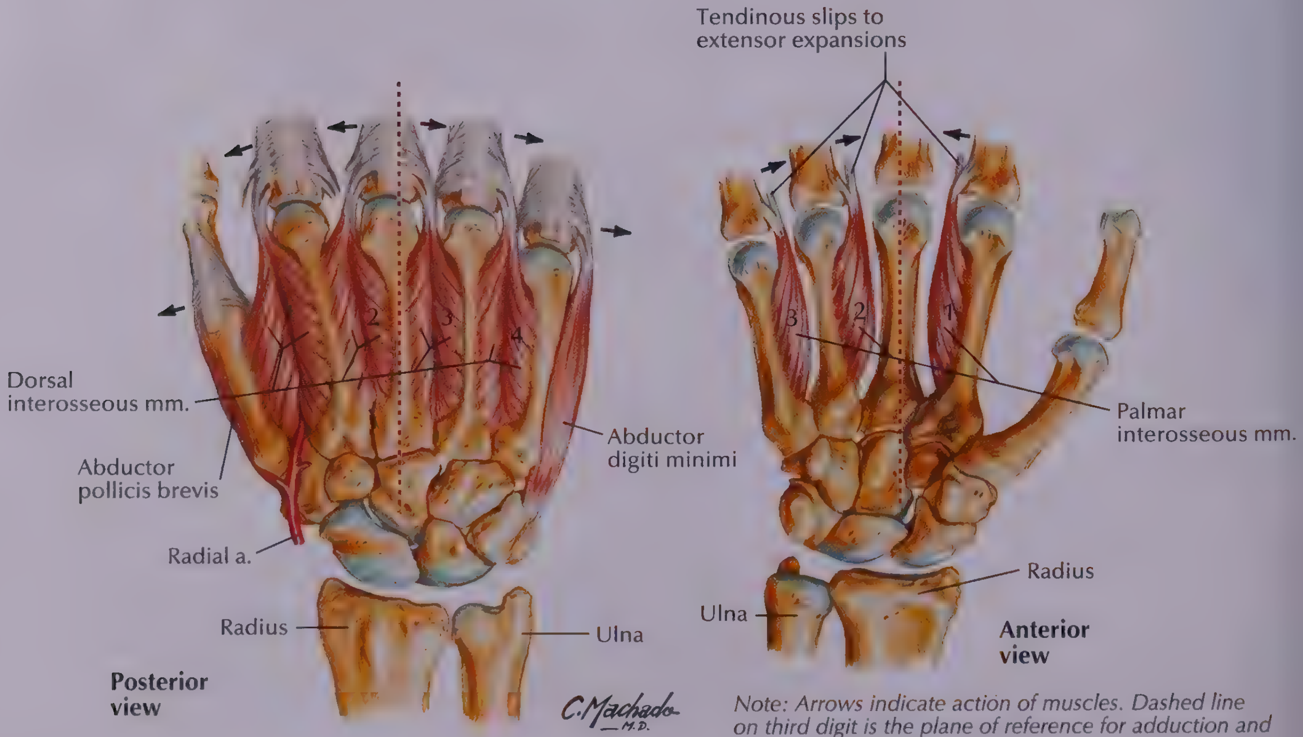

Finger in flexion: lateral view
Collateral ligament
Attachment of small deep slip of extensor tendon to proximal phalanx and joint capsule
Extensor tendon
Distal attachment of interosseous m. (to base of proximal phalanx and joint capsule)
Dorsal interosseous m.
Palmar interosseous m.
Palmar ligament
Distal attachment of lumbrical m. (to extensor expansion)
Flexor digitorum superficialis tendon (*cut*)
Lumbrical m.
Collateral ligaments
Flexor digitorum profundus tendon (*cut*)
Palmar ligament

Note: Black arrows indicate pull of extensor tendon; red arrows indicate pull of interosseous and lumbrical muscles; dots indicate axis of rotation of joints.

C.Machado M.D.


Lumbrical mm. (*reflected*)
Muscular branches of ulnar n. (to 3rd and 4th lumbrical mm. and to all interosseous mm.)
Deep transverse metacarpal ligaments
Common palmar digital aa.
Palmar metacarpal aa.
Deep palmar arch
Opponens digiti minimi m.
Flexor digiti minimi (*cut*)
Deep branch of ulnar n.
Deep palmar branch of ulnar a.
Abductor digiti minimi (*cut*)
Median n.
Pisiform bone
Palmar carpal arch
Flexor carpi ulnaris tendon
Palmar carpal branch of ulnar a.
Ulnar a.
Ulnar n.
Pronator quadratus
1st dorsal interosseous m.
Adductor pollicis
Flexor pollicis brevis
Abductor pollicis brevis (*cut*)
Muscular branches of median n. (to thenar mm. and to 1st and 2nd lumbrical mm.)
Opponens pollicis m.
Flexor retinaculum of wrist (*reflected*)
Superficial palmar branch of radial a.
Radius
Palmar carpal branch of radial a.
Radial a.

Anterior view


Dorsal interosseous mm.
1
2
3
4
Abductor pollicis brevis
Radial a.
Radius
Ulna
Abductor digiti minimi
Tendinous slips to extensor expansions
3
2
1
Palmar interosseous mm.
Ulna
Radius

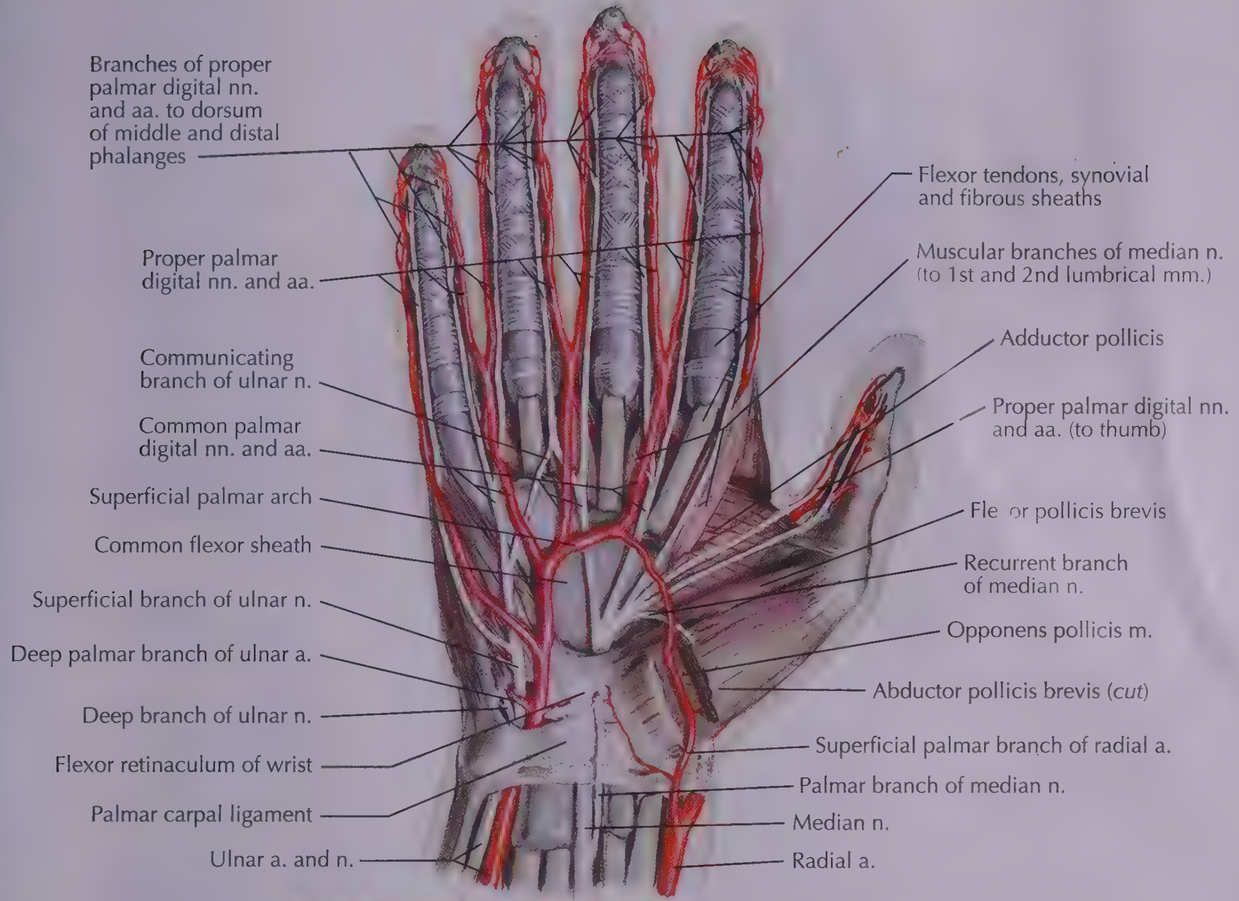
Posterior view

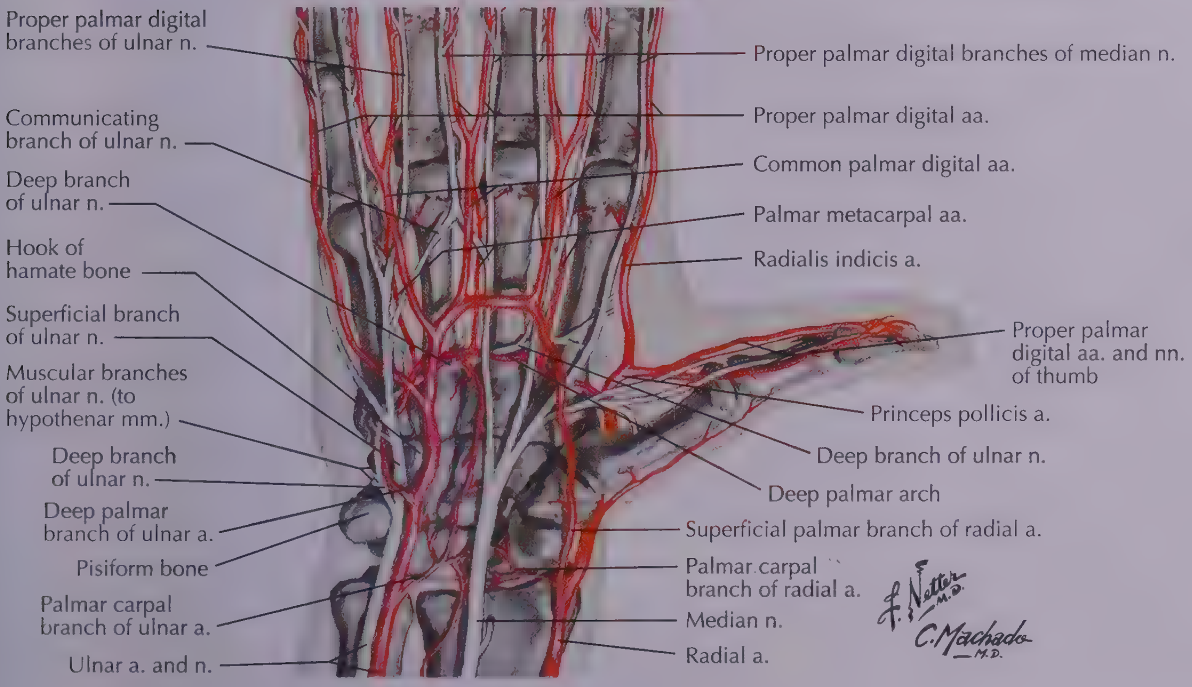
Anterior view

Note: Arrows indicate action of muscles. Dashed line on third digit is the plane of reference for adduction and abduction of the digits.

Arteries of Hand: Palmar Views

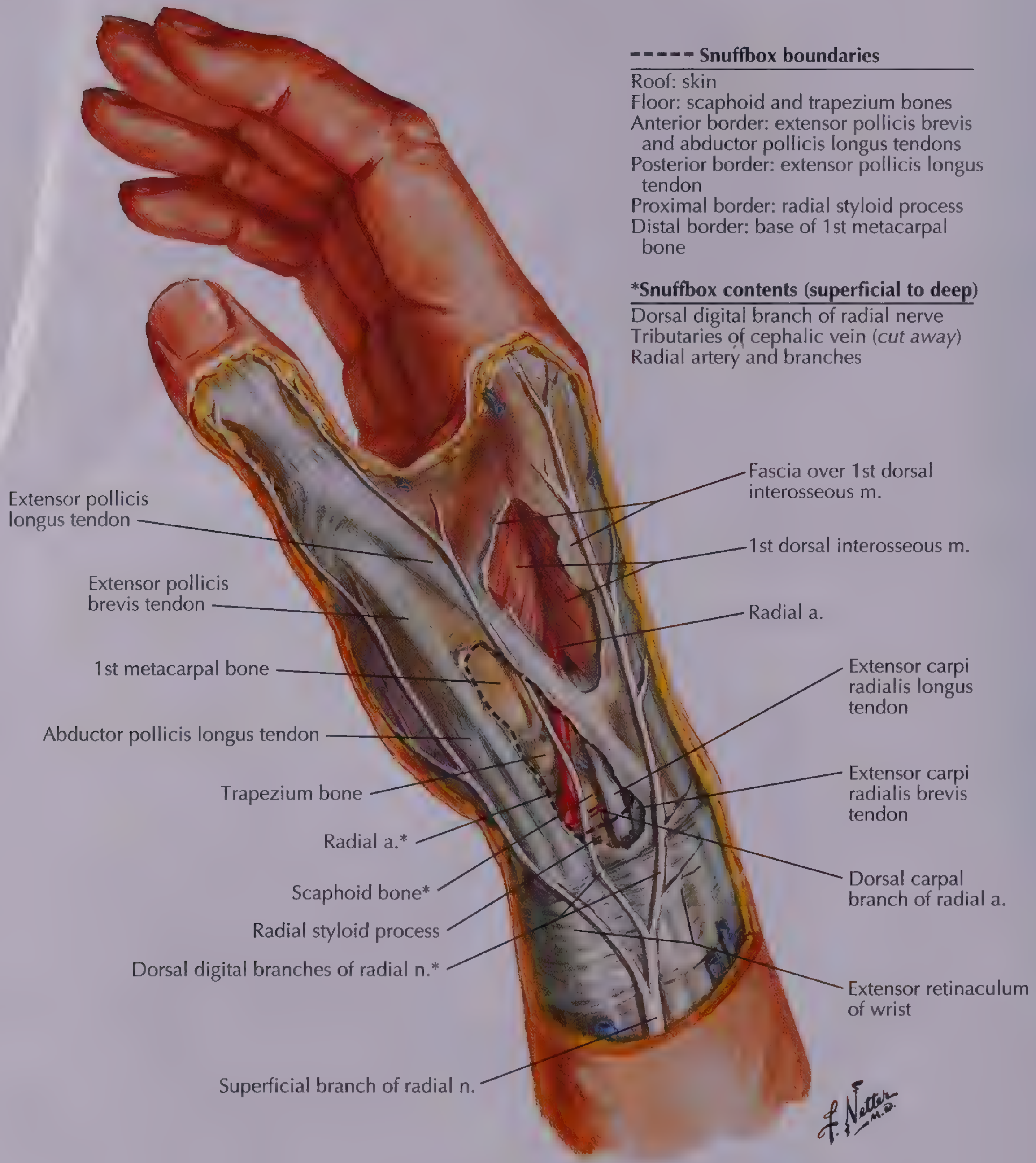
See also Plate 443


Branches of proper palmar digital nn. and aa. to dorsum of middle and distal phalanges
Proper palmar digital nn. and aa.
Communicating branch of ulnar n.
Common palmar digital nn. and aa.
Superficial palmar arch
Common flexor sheath
Superficial branch of ulnar n.
Deep palmar branch of ulnar a.
Deep branch of ulnar n.
Flexor retinaculum of wrist
Palmar carpal ligament
Ulnar a. and n.
Flexor tendons, synovial and fibrous sheaths
Muscular branches of median n. (to 1st and 2nd lumbrical mm.)
Adductor pollicis
Proper palmar digital nn. and aa. (to thumb)
Flexor pollicis brevis
Recurrent branch of median n.
Opponens pollicis m.
Abductor pollicis brevis (*cut*)
Superficial palmar branch of radial a.
Palmar branch of median n.
Median n.
Radial a.


Proper palmar digital branches of ulnar n.
Communicating branch of ulnar n.
Deep branch of ulnar n.
Hook of hamate bone
Superficial branch of ulnar n.
Muscular branches of ulnar n. (to hypothenar mm.)
Deep branch of ulnar n.
Deep palmar branch of ulnar a.
Pisiform bone
Palmar carpal branch of ulnar a.
Ulnar a. and n.
Proper palmar digital branches of median n.
Proper palmar digital aa.
Common palmar digital aa.
Palmar metacarpal aa.
Radialis indicis a.
Proper palmar digital aa. and nn. of thumb
Princeps pollicis a.
Deep branch of ulnar n.
Deep palmar arch
Superficial palmar branch of radial a.
Palmar carpal branch of radial a.
Median n.
Radial a.
F. Netter M.D.
C. Machado M.D.

Wrist and Hand: Superficial Lateral Dissection

See also Plate 489


Fascia over 1st dorsal interosseous m.
1st dorsal interosseous m.
Radial a.
Extensor carpi radialis longus tendon
Extensor carpi radialis brevis tendon
Dorsal carpal branch of radial a.
Extensor retinaculum of wrist
Extensor pollicis longus tendon
Extensor pollicis brevis tendon
1st metacarpal bone
Abductor pollicis longus tendon
Trapezium bone
Radial a.*
Scaphoid bone*
Radial styloid process
Dorsal digital branches of radial n.*
Superficial branch of radial n.
F. Netter M.D.

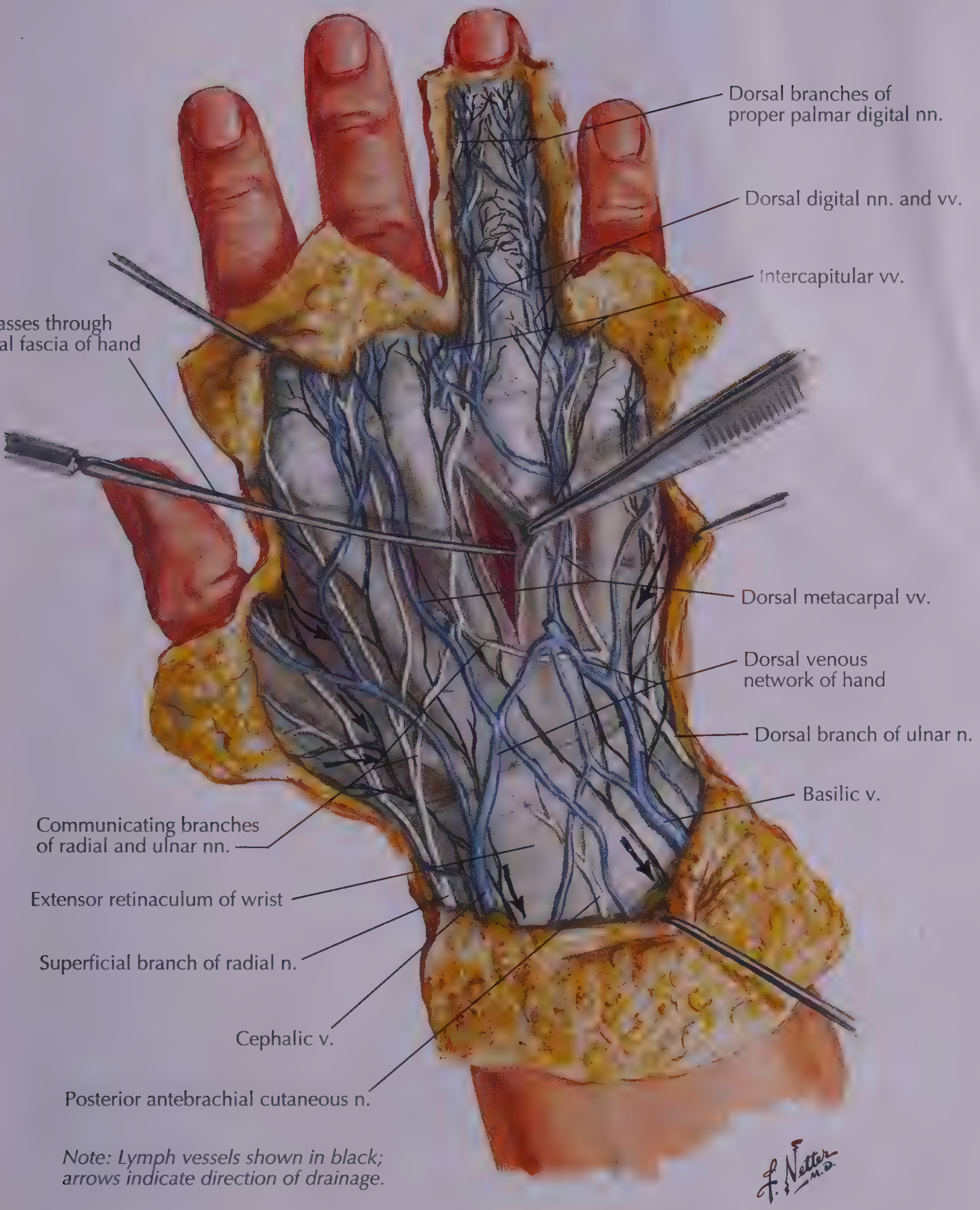
----- Snuffbox boundaries

Roof: skin
Floor: scaphoid and trapezium bones
Anterior border: extensor pollicis brevis and abductor pollicis longus tendons
Posterior border: extensor pollicis longus tendon
Proximal border: radial styloid process
Distal border: base of 1st metacarpal bone

***Snuffbox contents (superficial to deep)**

Dorsal digital branch of radial nerve
Tributaries of cephalic vein (*cut away*)
Radial artery and branches

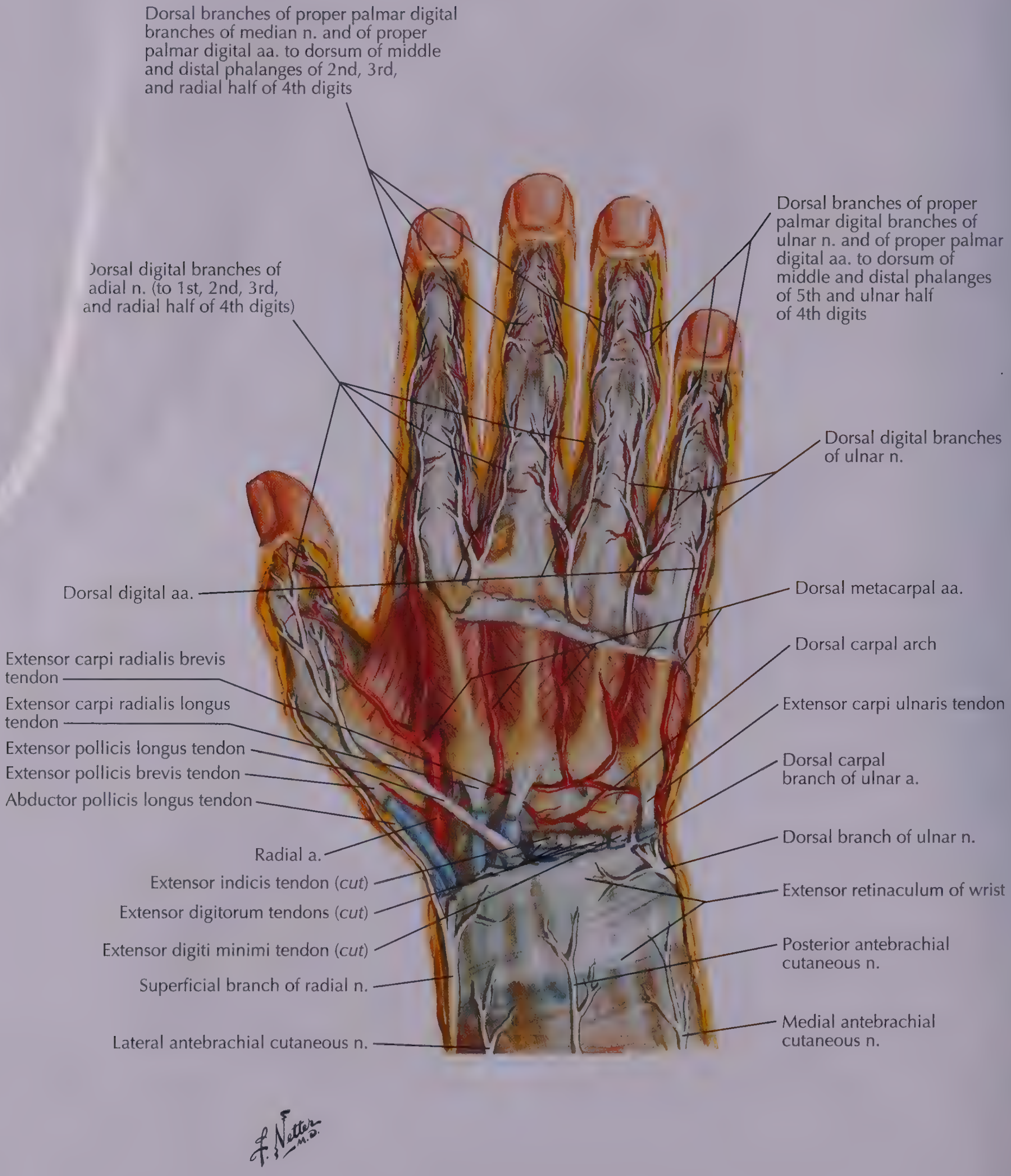
See also Plate 425


Dorsal branches of proper palmar digital nn.
Dorsal digital nn. and vv.
Intercapitular vv.
Probe passes through the dorsal fascia of hand
Dorsal metacarpal vv.
Dorsal venous network of hand
Dorsal branch of ulnar n.
Basilic v.
Communicating branches of radial and ulnar nn.
Extensor retinaculum of wrist
Superficial branch of radial n.
Cephalic v.
Posterior antebrachial cutaneous n.
F. Netter M.D.

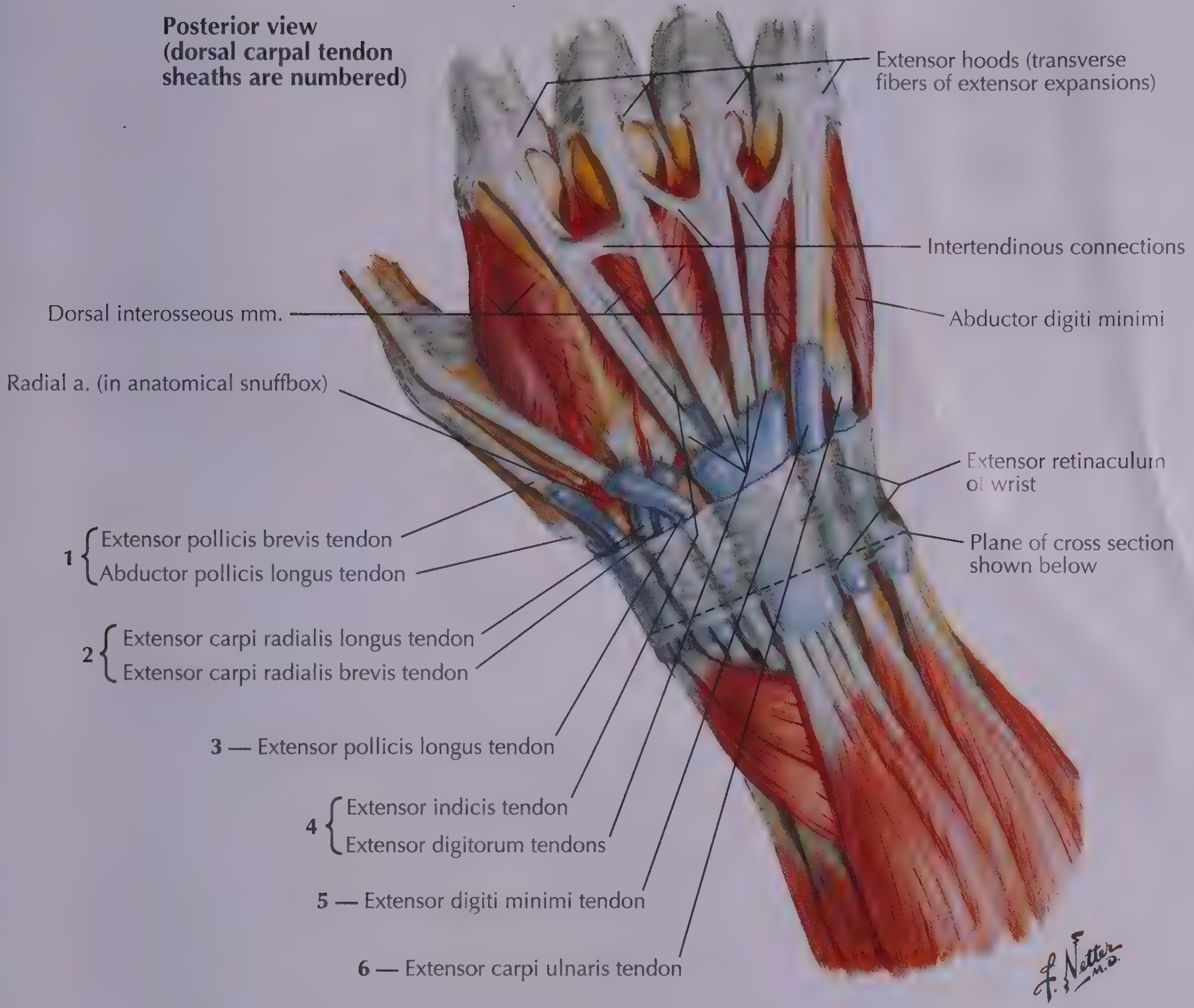
Note: Lymph vessels shown in black; arrows indicate direction of drainage.

Nerves and Arteries of Dorsal Hand and Wrist

See also Plate 480


Dorsal branches of proper palmar digital branches of median n. and of proper palmar digital aa. to dorsum of middle and distal phalanges of 2nd, 3rd, and radial half of 4th digits
Dorsal branches of proper palmar digital branches of ulnar n. and of proper palmar digital aa. to dorsum of middle and distal phalanges of 5th and ulnar half of 4th digits
)orsal digital branches of adial n. (to 1st, 2nd, 3rd, and radial half of 4th digits)
Dorsal digital branches of ulnar n.
Dorsal digital aa.
Dorsal metacarpal aa.
Dorsal carpal arch
Extensor carpi radialis brevis tendon
Extensor carpi radialis longus tendon
Extensor carpi ulnaris tendon
Extensor pollicis longus tendon
Extensor pollicis brevis tendon
Dorsal carpal branch of ulnar a.
Abductor pollicis longus tendon
Radial a.
Dorsal branch of ulnar n.
Extensor indicis tendon (*cut*)
Extensor retinaculum of wrist
Extensor digitorum tendons (*cut*)
Extensor digiti minimi tendon (*cut*)
Posterior antebrachial cutaneous n.
Superficial branch of radial n.
Lateral antebrachial cutaneous n.
Medial antebrachial cutaneous n.
F. Netter M.D.

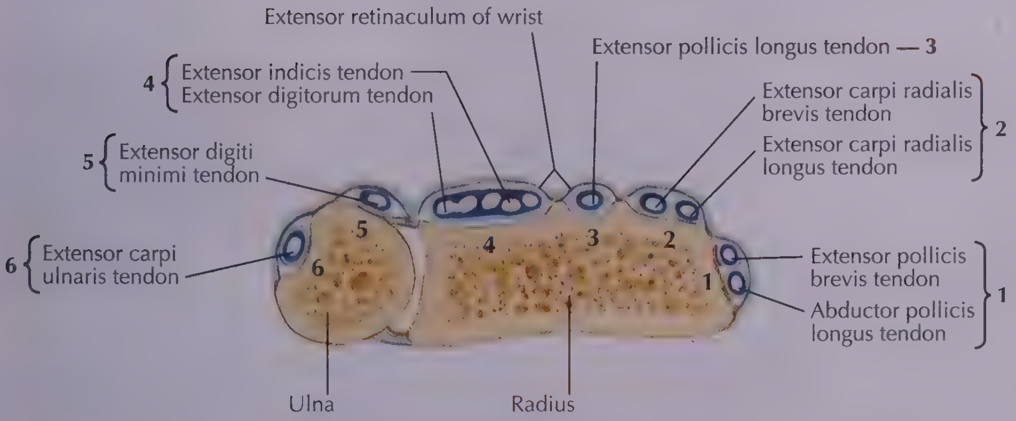
See also Plates 454, 455



Posterior view (dorsal carpal tendon sheaths are numbered)

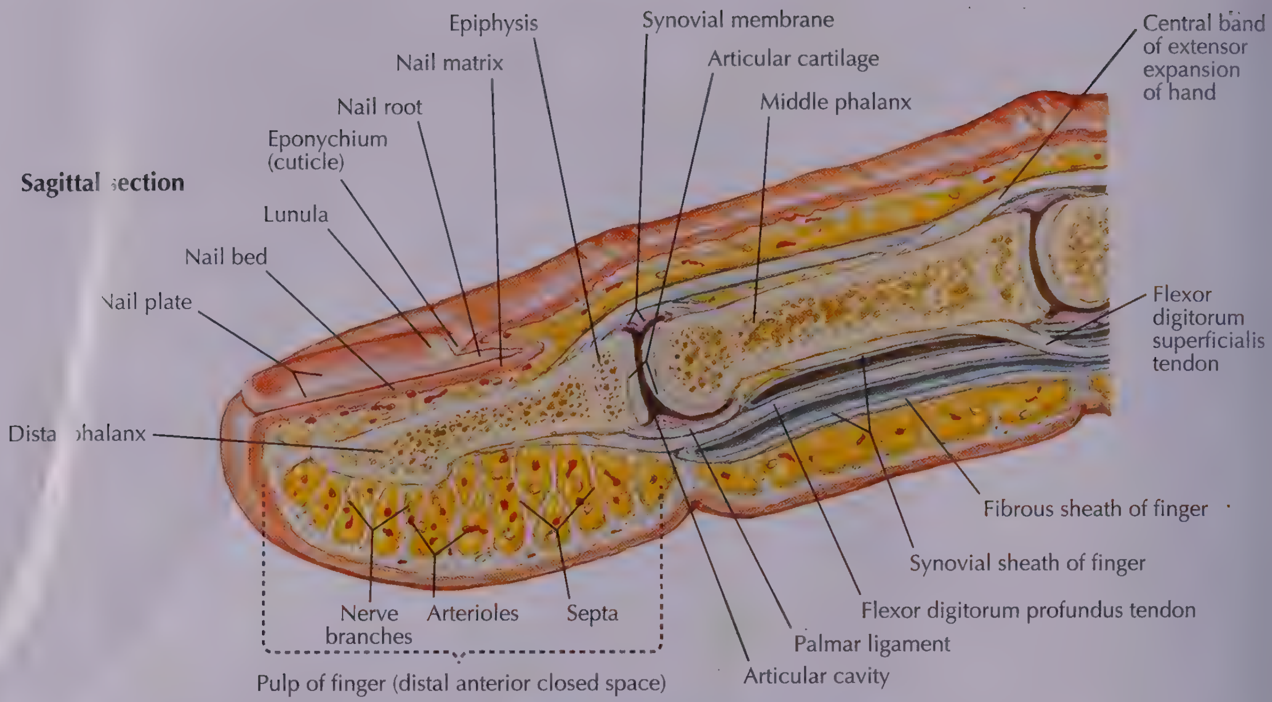
Extensor hoods (transverse fibers of extensor expansions)
Intertendinous connections
Dorsal interosseous mm.
Abductor digiti minimi
Radial a. (in anatomical snuffbox)
Extensor retinaculum of wrist
1 { Extensor pollicis brevis tendon
Abductor pollicis longus tendon
Plane of cross section shown below
2 { Extensor carpi radialis longus tendon
Extensor carpi radialis brevis tendon
3 — Extensor pollicis longus tendon
4 { Extensor indicis tendon
Extensor digitorum tendons
5 — Extensor digiti minimi tendon
6 — Extensor carpi ulnaris tendon
F. Netter M.D.

Cross section of distal forearm

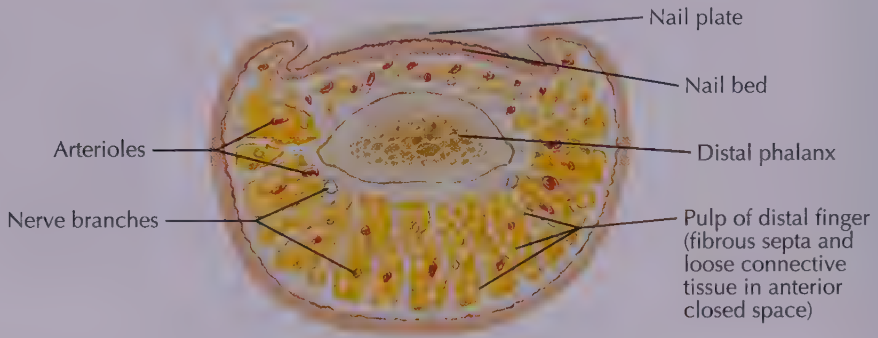


Extensor retinaculum of wrist
Extensor pollicis longus tendon — 3
4 { Extensor indicis tendon
Extensor digitorum tendon
Extensor carpi radialis brevis tendon
Extensor carpi radialis longus tendon } 2
5 { Extensor digiti minimi tendon
6 { Extensor carpi ulnaris tendon
Extensor pollicis brevis tendon
Abductor pollicis longus tendon } 1
5
4
3
2
6
1
Ulna
Radius

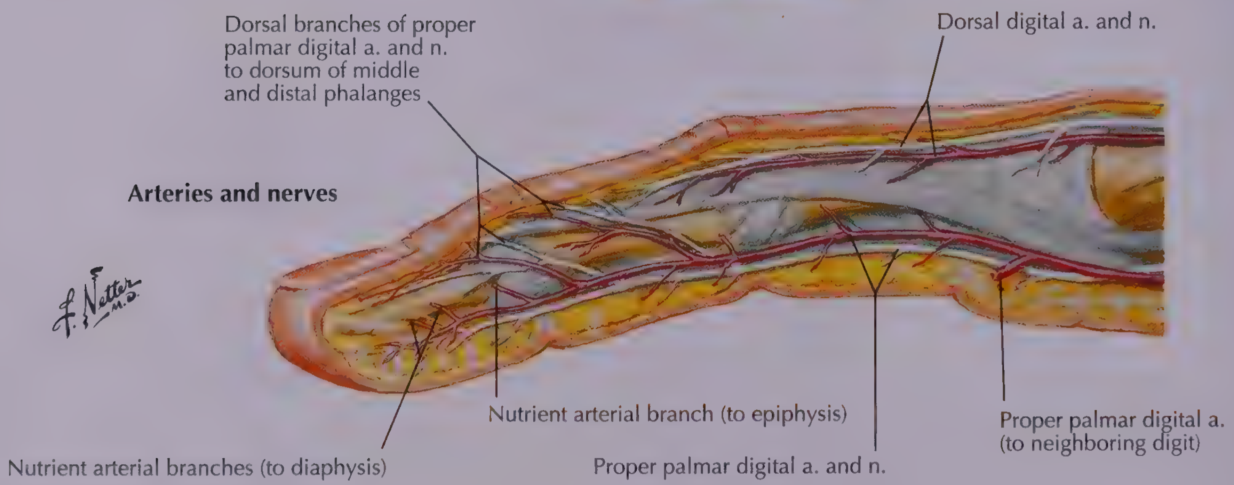
Sagittal section


Epiphysis
Synovial membrane
Nail matrix
Articular cartilage
Nail root
Middle phalanx
Central band of extensor expansion of hand
Eponychium (cuticle)
Lunula
Nail bed
Nail plate
Flexor digitorum superficialis tendon
Distal phalanx
Fibrous sheath of finger
Synovial sheath of finger
Nerve branches
Arterioles
Septa
Flexor digitorum profundus tendon
Palmar ligament
Articular cavity
Pulp of finger (distal anterior closed space)

Cross section through distal finger

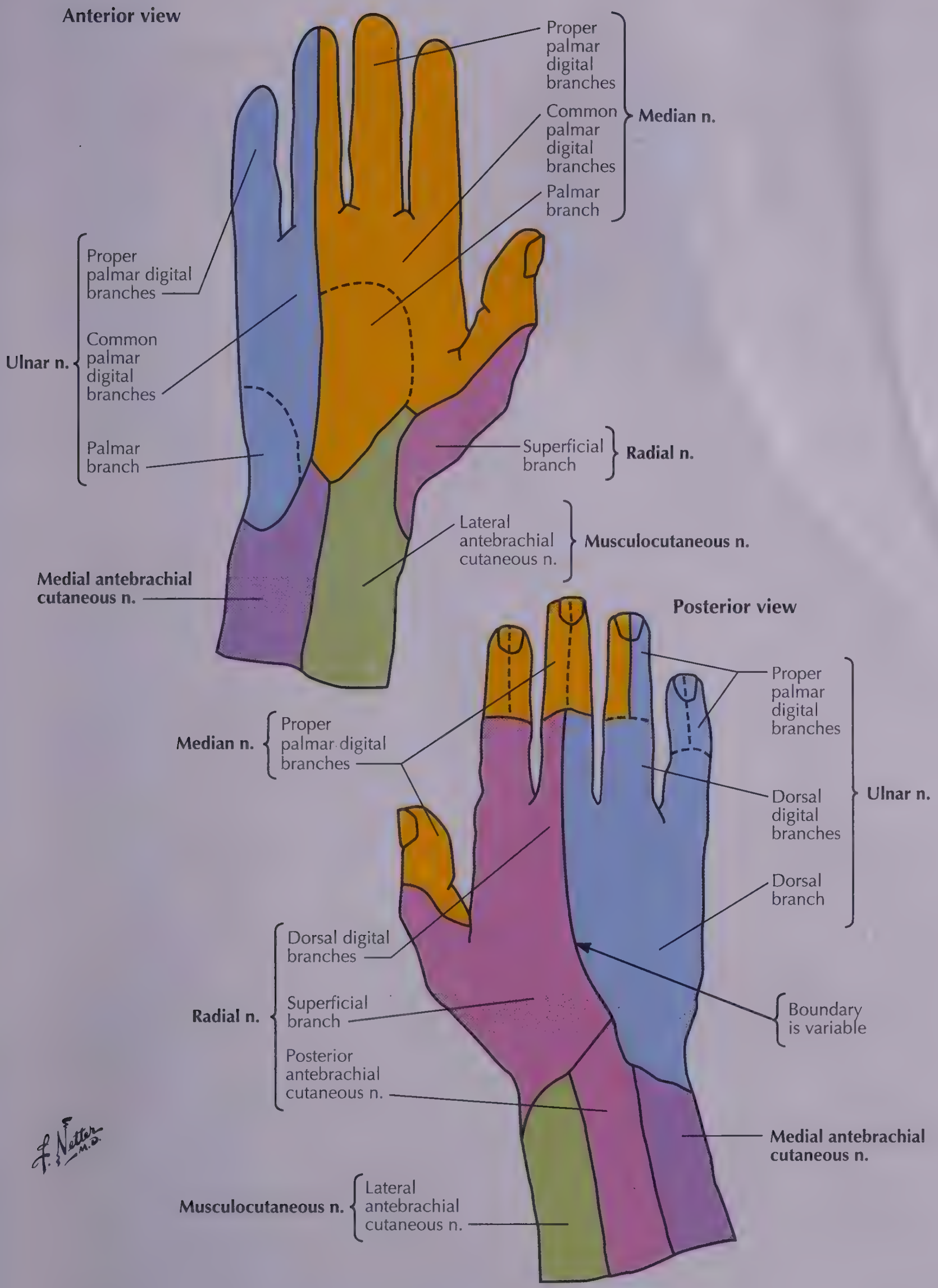

Nail plate
Nail bed
Arterioles
Distal phalanx
Nerve branches
Pulp of distal finger (fibrous septa and loose connective tissue in anterior closed space)

Arteries and nerves


Dorsal branches of proper palmar digital a. and n. to dorsum of middle and distal phalanges
Dorsal digital a. and n.
Nutrient arterial branch (to epiphysis)
Proper palmar digital a. (to neighboring digit)
Nutrient arterial branches (to diaphysis)
Proper palmar digital a. and n.

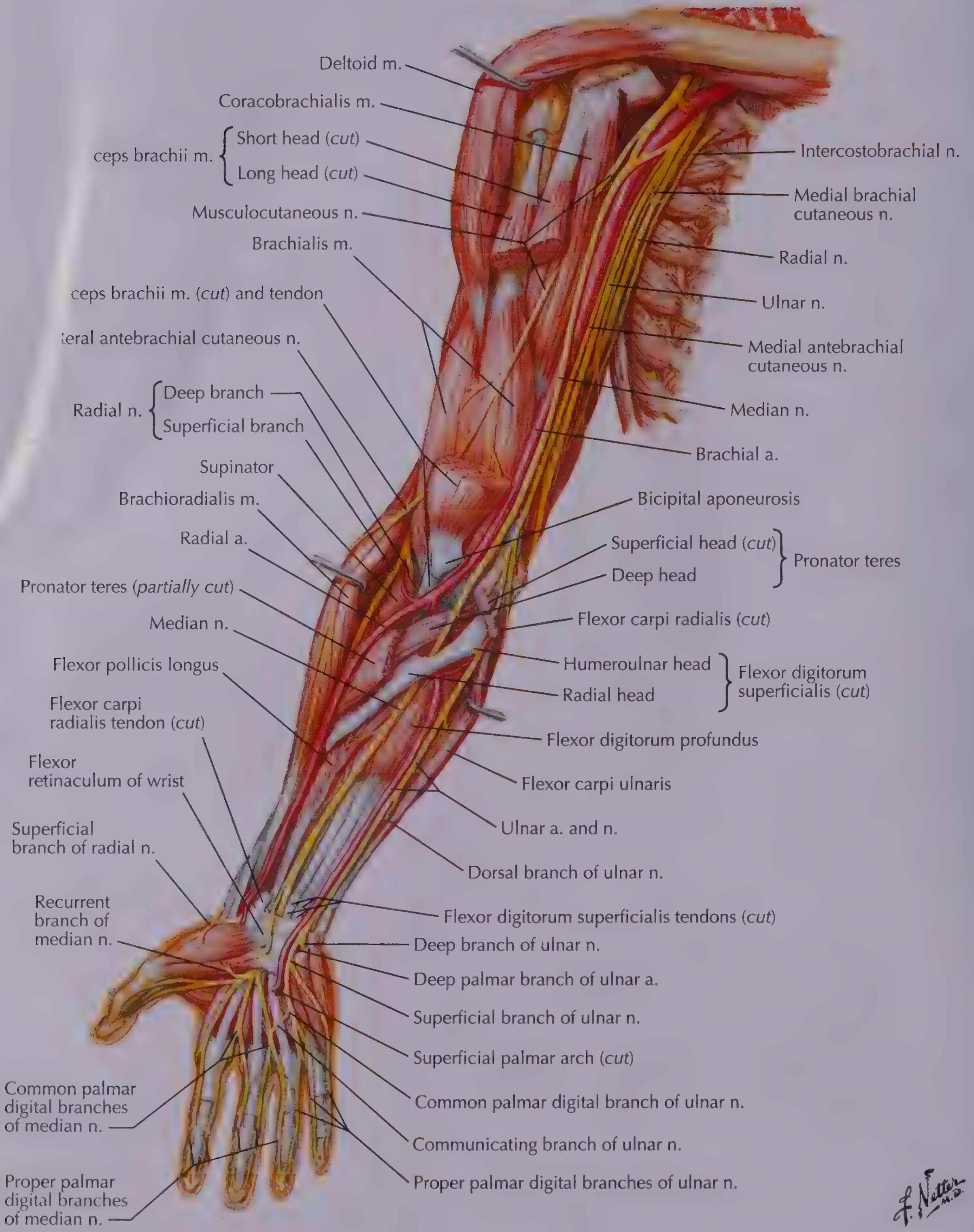
Cutaneous Innervation of Wrist and Hand

See also Plates 423, 472

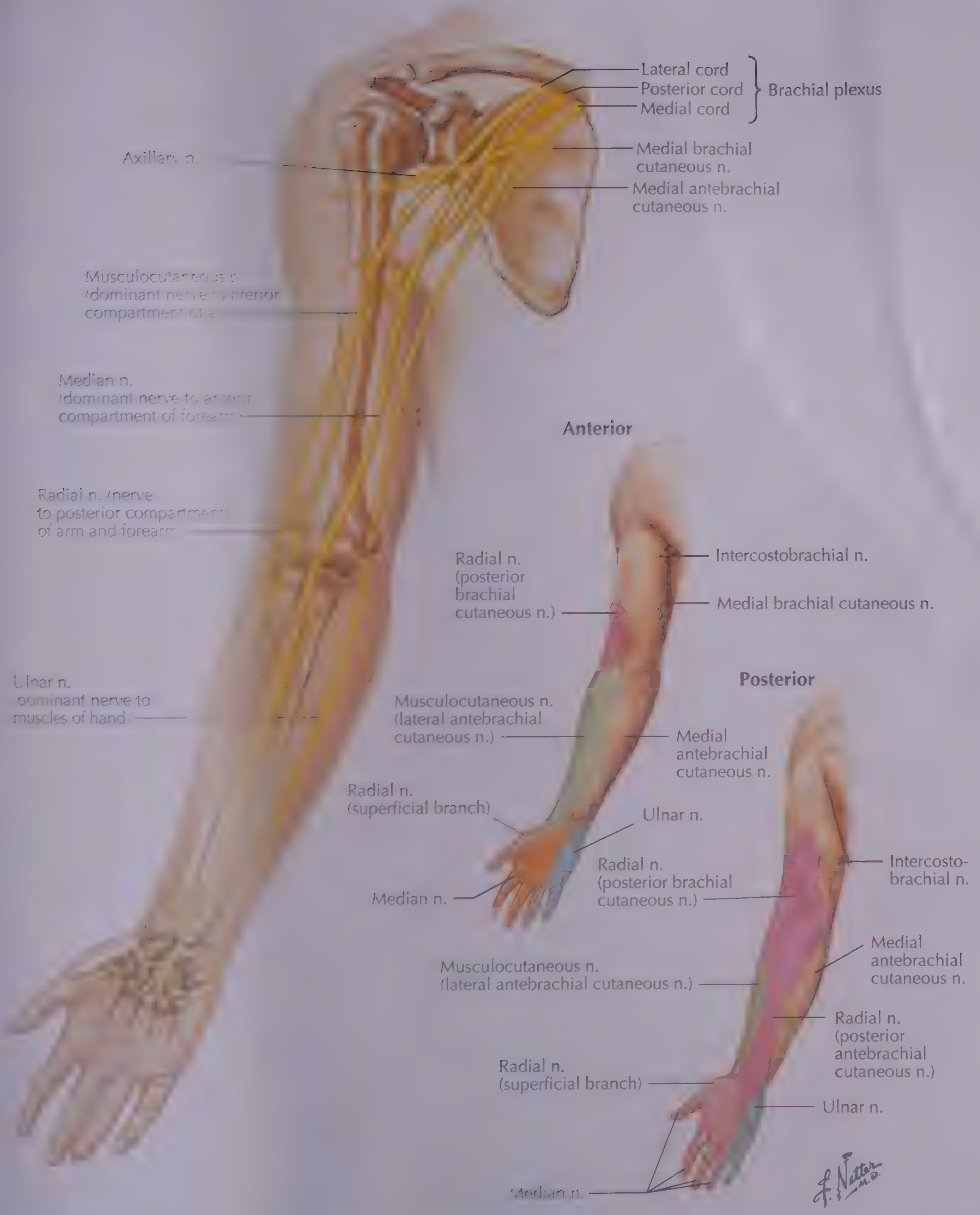

Anterior view
Proper palmar digital branches
Common palmar digital branches
Palmar branch
Median n.
Proper palmar digital branches
Common palmar digital branches
Palmar branch
Ulnar n.
Superficial branch
Radial n.
Lateral antebrachial cutaneous n.
Musculocutaneous n.
Medial antebrachial cutaneous n.
Posterior view
Median n.
Proper palmar digital branches
Proper palmar digital branches
Dorsal digital branches
Dorsal branch
Ulnar n.
Boundary is variable
Dorsal digital branches
Superficial branch
Posterior antebrachial cutaneous n.
Radial n.
Medial antebrachial cutaneous n.
Musculocutaneous n.
Lateral antebrachial cutaneous n.

Arteries and Nerves of Upper Limb: Anterior View

See also Plates 442, 458

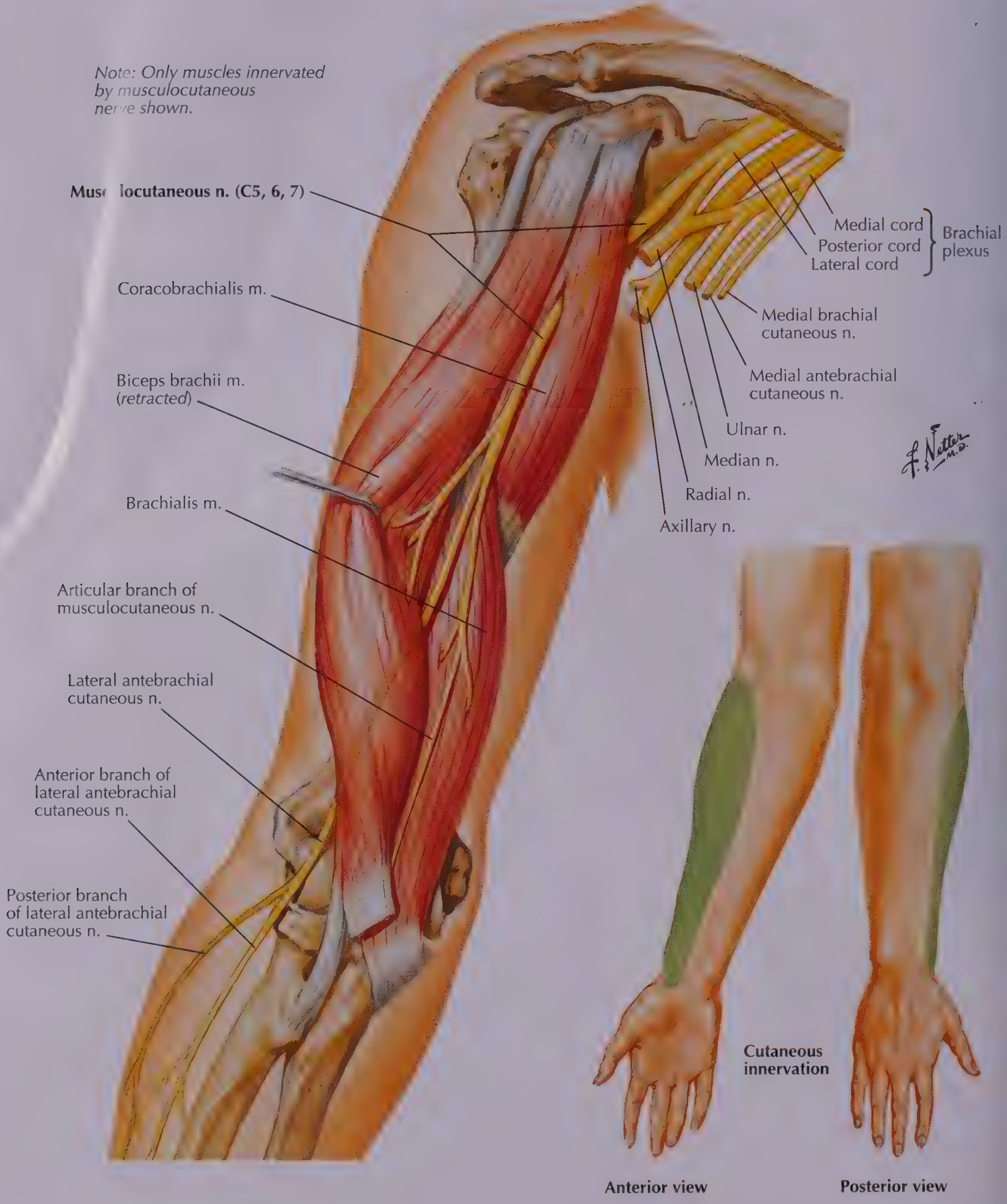

Deltoid m.
Coracobrachialis m.
ceps brachii m.
Short head (cut)
Long head (cut)
Musculocutaneous n.
Brachialis m.
ceps brachii m. (cut) and tendon
teral antebrachial cutaneous n.
Radial n.
Deep branch
Superficial branch
Supinator
Brachioradialis m.
Radial a.
Pronator teres (partially cut)
Median n.
Flexor pollicis longus
Flexor carpi radialis tendon (cut)
Flexor retinaculum of wrist
Superficial branch of radial n.
Recurrent branch of median n.
Common palmar digital branches of median n.
Proper palmar digital branches of median n.
Intercostobrachial n.
Medial brachial cutaneous n.
Radial n.
Ulnar n.
Medial antebrachial cutaneous n.
Median n.
Brachial a.
Bicipital aponeurosis
Superficial head (cut)
Deep head
Pronator teres
Flexor carpi radialis (cut)
Humeroulnar head
Radial head
Flexor digitorum superficialis (cut)
Flexor digitorum profundus
Flexor carpi ulnaris
Ulnar a. and n.
Dorsal branch of ulnar n.
Flexor digitorum superficialis tendons (cut)
Deep branch of ulnar n.
Deep palmar branch of ulnar a.
Superficial branch of ulnar n.
Superficial palmar arch (cut)
Common palmar digital branch of ulnar n.
Communicating branch of ulnar n.
Proper palmar digital branches of ulnar n.

See also Plates 423, 433, 439


Lateral cord
Posterior cord
Medial cord
Brachial plexus
Medial brachial cutaneous n.
Medial antebrachial cutaneous n.
Axillary n.
Musculocutaneous n. (dominant nerve to anterior compartment of arm)
Median n. (dominant nerve to anterior compartment of forearm)
Radial n. (nerve to posterior compartment of arm and forearm)
Ulnar n. (dominant nerve to muscles of hand)
Anterior
Radial n. (posterior brachial cutaneous n.)
Intercostobrachial n.
Medial brachial cutaneous n.
Musculocutaneous n. (lateral antebrachial cutaneous n.)
Medial antebrachial cutaneous n.
Radial n. (superficial branch)
Ulnar n.
Median n.
Posterior
Radial n. (posterior brachial cutaneous n.)
Intercosto-brachial n.
Musculocutaneous n. (lateral antebrachial cutaneous n.)
Medial antebrachial cutaneous n.
Radial n. (posterior antebrachial cutaneous n.)
Radial n. (superficial branch)
Ulnar n.
Median n.
F. Netter M.D.

Musculocutaneous Nerve

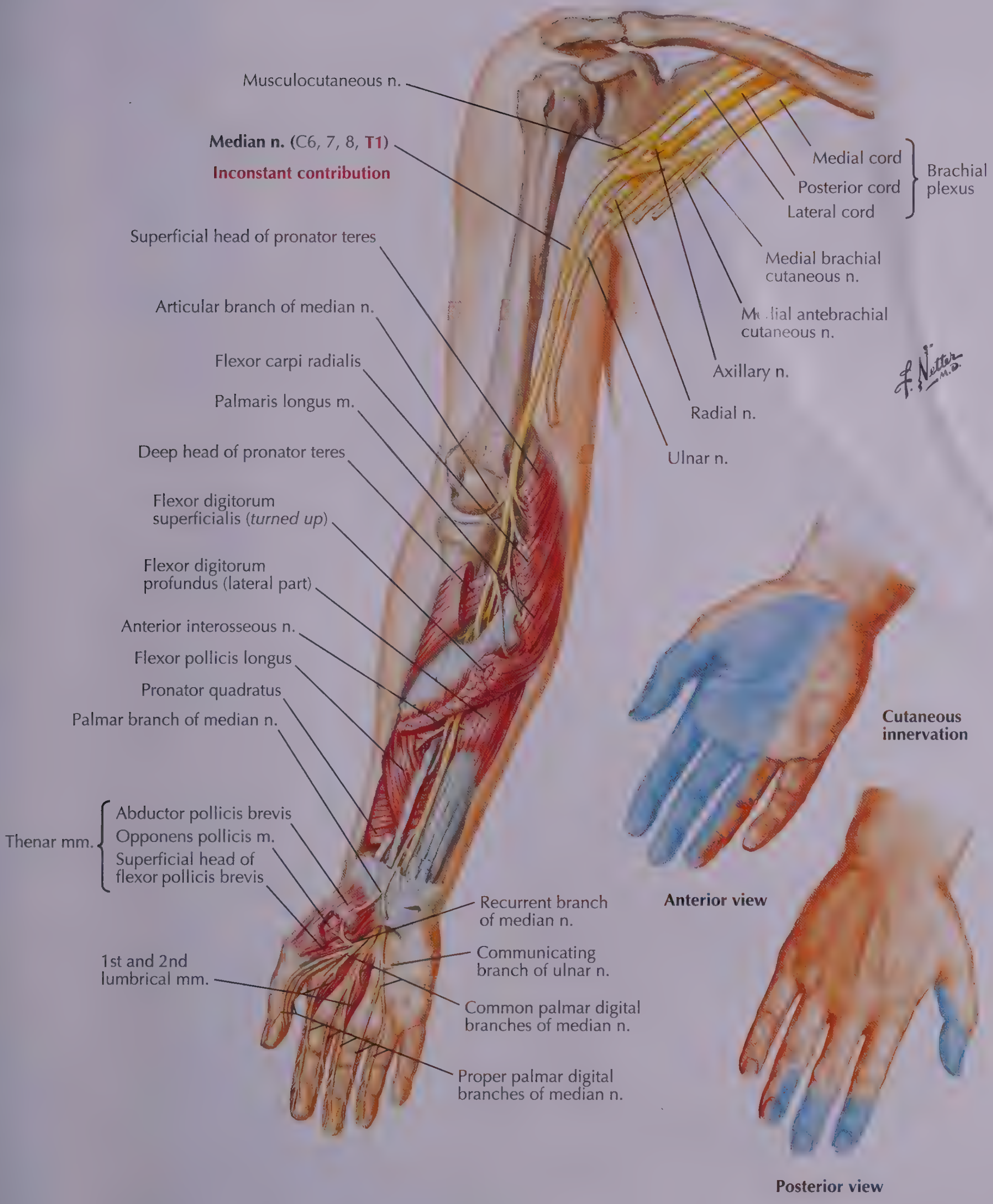
See also Plate 440


Note: Only muscles innervated by musculocutaneous nerve shown.
Musculocutaneous n. (C5, 6, 7)
Coracobrachialis m.
Biceps brachii m. (retracted)
Brachialis m.
Articular branch of musculocutaneous n.
Lateral antebrachial cutaneous n.
Anterior branch of lateral antebrachial cutaneous n.
Posterior branch of lateral antebrachial cutaneous n.
Medial cord
Posterior cord
Lateral cord
Brachial plexus
Medial brachial cutaneous n.
Medial antebrachial cutaneous n.
Ulnar n.
Median n.
Radial n.
Axillary n.
Cutaneous innervation
Anterior view
Posterior view

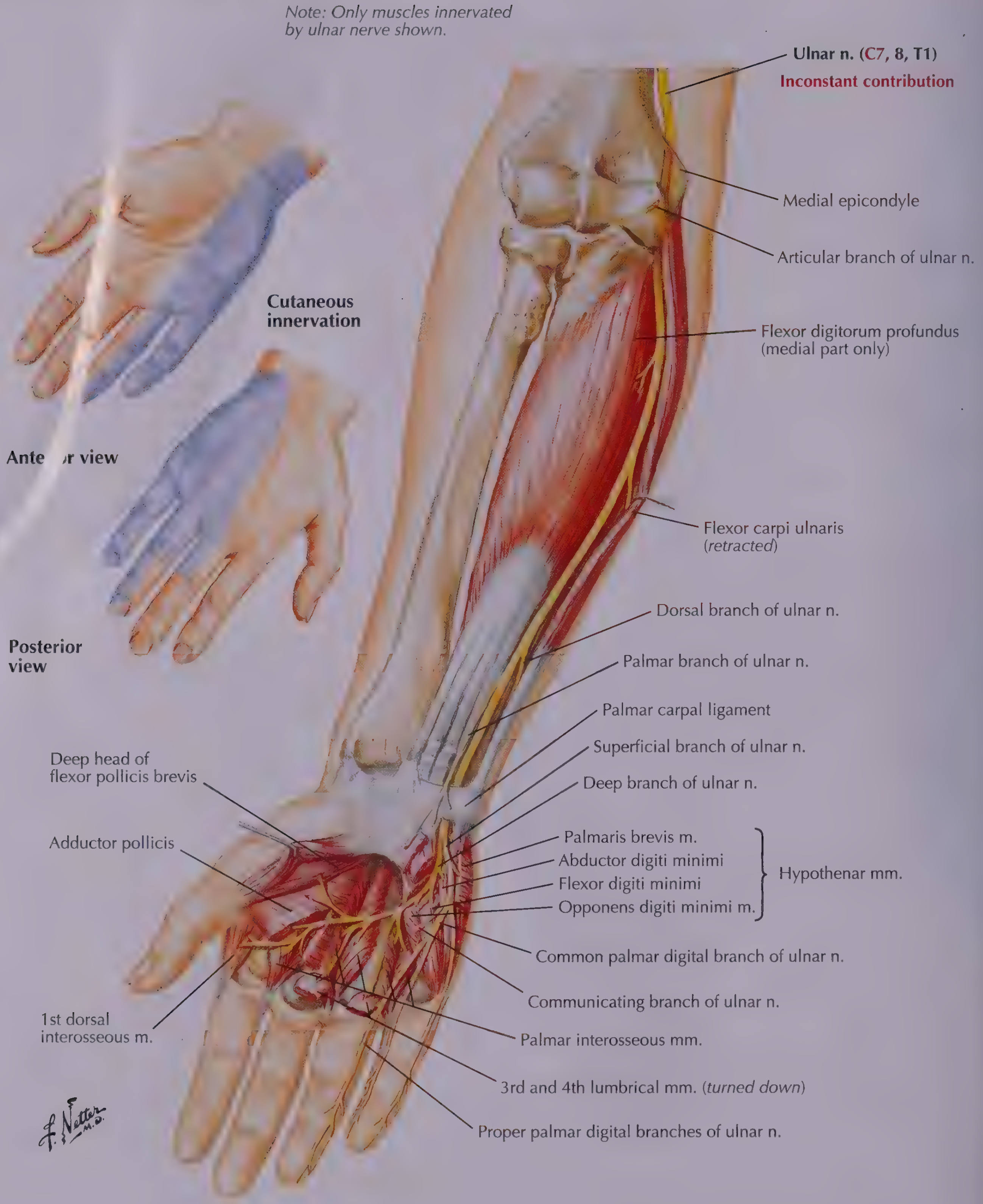
Median Nerve

See also Plates 423, 456, 457

Note: Only muscles innervated by median nerve shown.

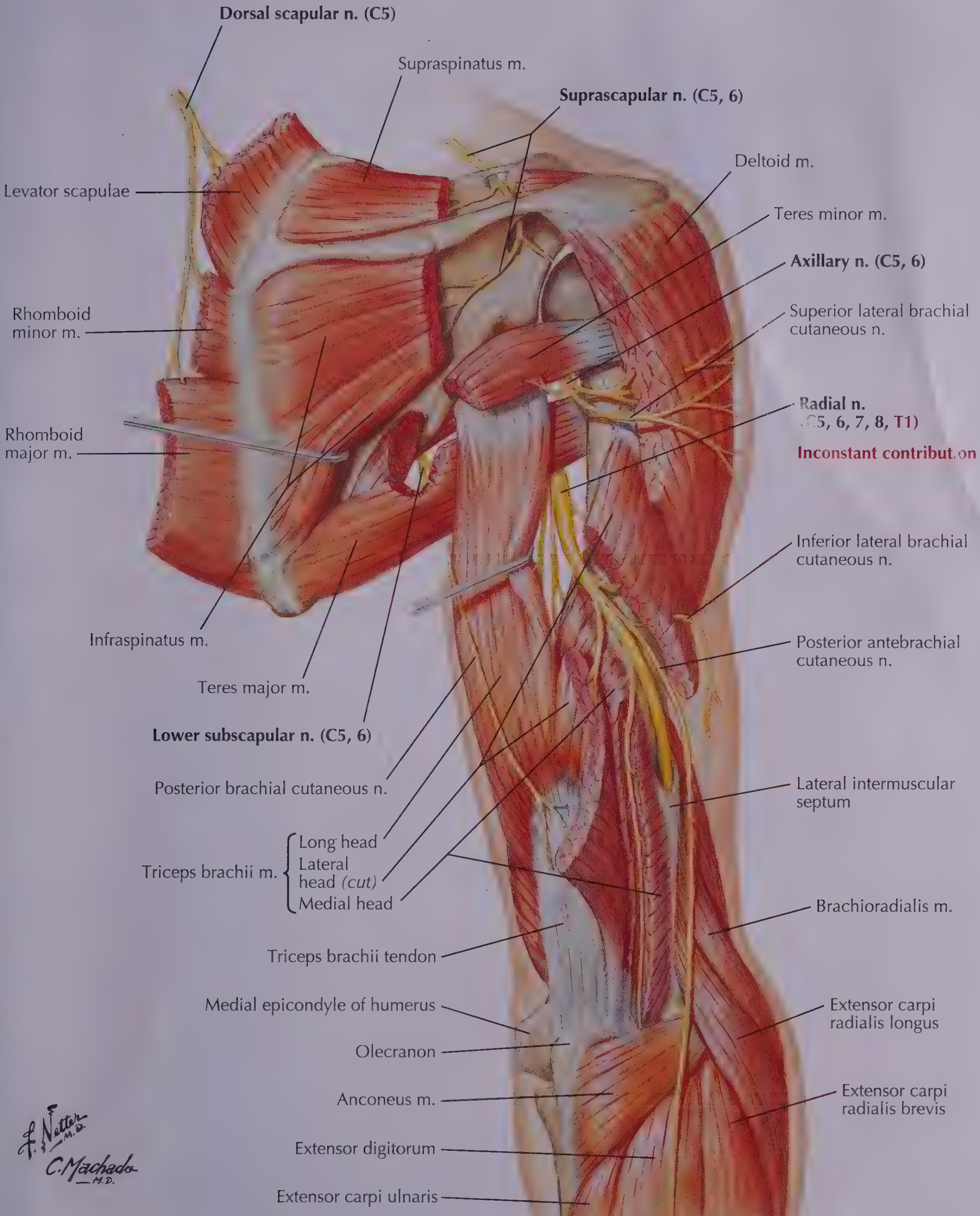

Musculocutaneous n.
Median n. (C6, 7, 8, T1)
Inconstant contribution
Superficial head of pronator teres
Articular branch of median n.
Flexor carpi radialis
Palmaris longus m.
Deep head of pronator teres
Flexor digitorum superficialis (*turned up*)
Flexor digitorum profundus (lateral part)
Anterior interosseous n.
Flexor pollicis longus
Pronator quadratus
Palmar branch of median n.
Thenar mm.
Abductor pollicis brevis
Opponens pollicis m.
Superficial head of flexor pollicis brevis
1st and 2nd lumbrical mm.
Medial cord
Posterior cord
Lateral cord
Brachial plexus
Medial brachial cutaneous n.
Medial antebrachial cutaneous n.
Axillary n.
Radial n.
Ulnar n.
F. Netter M.D.
Recurrent branch of median n.
Communicating branch of ulnar n.
Common palmar digital branches of median n.
Proper palmar digital branches of median n.
Cutaneous innervation
Anterior view
Posterior view

See also Plates 456, 457


Note: Only muscles innervated by ulnar nerve shown.
Cutaneous innervation
Anterior view
Posterior view
Ulnar n. (C7, 8, T1)
Inconstant contribution
Medial epicondyle
Articular branch of ulnar n.
Flexor digitorum profundus (medial part only)
Flexor carpi ulnaris (retracted)
Dorsal branch of ulnar n.
Palmar branch of ulnar n.
Palmar carpal ligament
Superficial branch of ulnar n.
Deep branch of ulnar n.
Palmaris brevis m.
Abductor digiti minimi
Flexor digiti minimi
Opponens digiti minimi m.
Hypothenar mm.
Common palmar digital branch of ulnar n.
Communicating branch of ulnar n.
Palmar interosseous mm.
3rd and 4th lumbrical mm. (turned down)
Proper palmar digital branches of ulnar n.
Deep head of flexor pollicis brevis
Adductor pollicis
1st dorsal interosseous m.

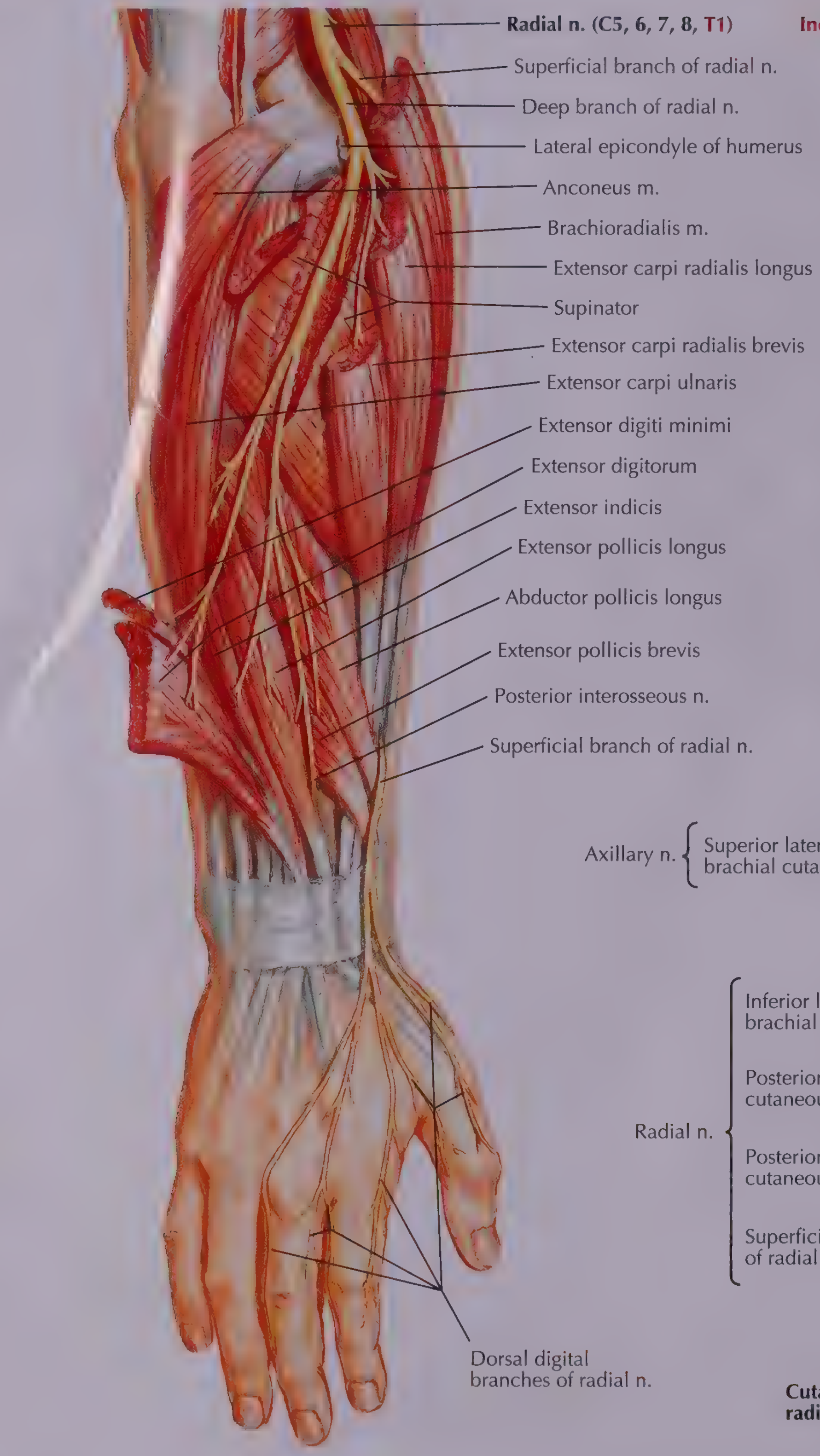
Radial Nerve in Arm and Nerves of Posterior Shoulder

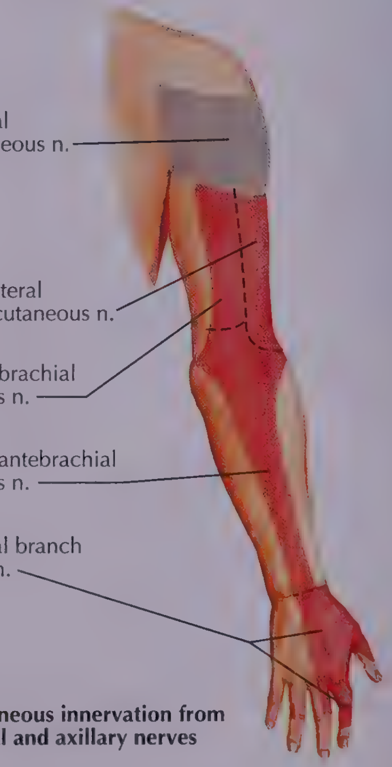
See also Plates 436, 441


Dorsal scapular n. (C5)
Supraspinatus m.
Suprascapular n. (C5, 6)
Deltoid m.
Levator scapulae
Teres minor m.
Axillary n. (C5, 6)
Superior lateral brachial cutaneous n.
Rhomboid minor m.
Radial n. (C5, 6, 7, 8, T1)
Inconstant contribution
Rhomboid major m.
Inferior lateral brachial cutaneous n.
Infraspinatus m.
Posterior antebrachial cutaneous n.
Teres major m.
Lower subscapular n. (C5, 6)
Posterior brachial cutaneous n.
Lateral intermuscular septum
Triceps brachii m.
Long head
Lateral head *(cut)*
Medial head
Brachioradialis m.
Triceps brachii tendon
Medial epicondyle of humerus
Extensor carpi radialis longus
Olecranon
Anconeus m.
Extensor carpi radialis brevis
Extensor digitorum
Extensor carpi ulnaris
F. Netter M.D.
C.Machado M.D.

Radial Nerve in Forearm and Hand

See also Plates 454, 477

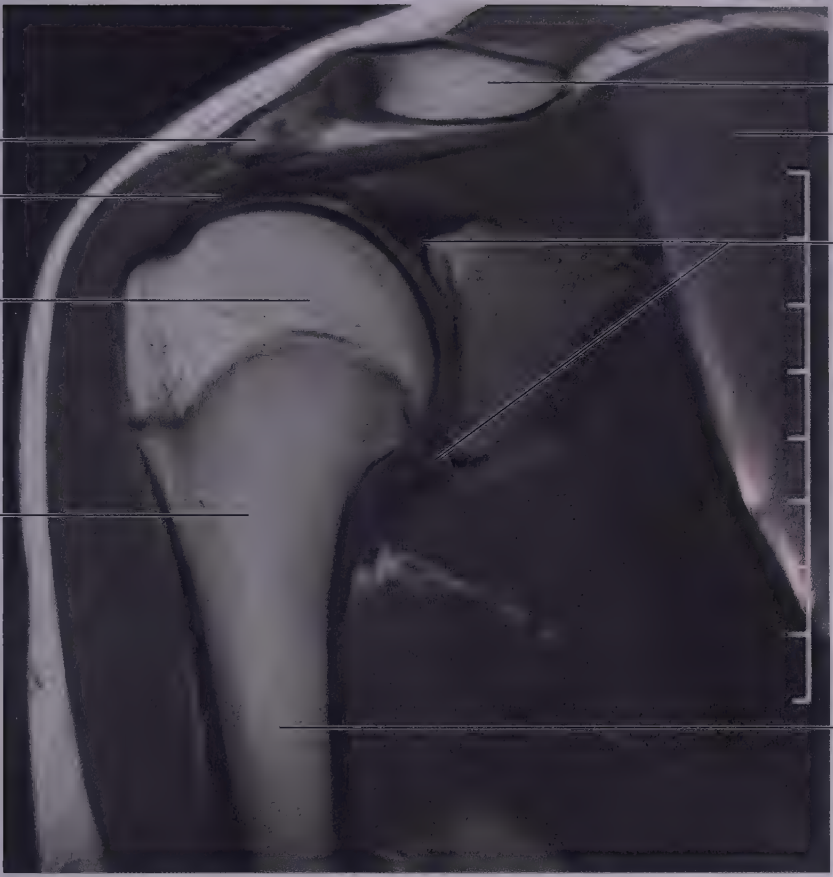

Radial n. (C5, 6, 7, 8, T1)
Inconstant contribution
Superficial branch of radial n.
Deep branch of radial n.
Lateral epicondyle of humerus
Anconeus m.
Brachioradialis m.
Extensor carpi radialis longus
Supinator
Extensor carpi radialis brevis
Extensor carpi ulnaris
Extensor digiti minimi
Extensor digitorum
Extensor indicis
Extensor pollicis longus
Abductor pollicis longus
Extensor pollicis brevis
Posterior interosseous n.
Superficial branch of radial n.
Dorsal digital branches of radial n.


Axillary n.
Superior lateral brachial cutaneous n.
Radial n.
Inferior lateral brachial cutaneous n.
Posterior brachial cutaneous n.
Posterior antebrachial cutaneous n.
Superficial branch of radial n.

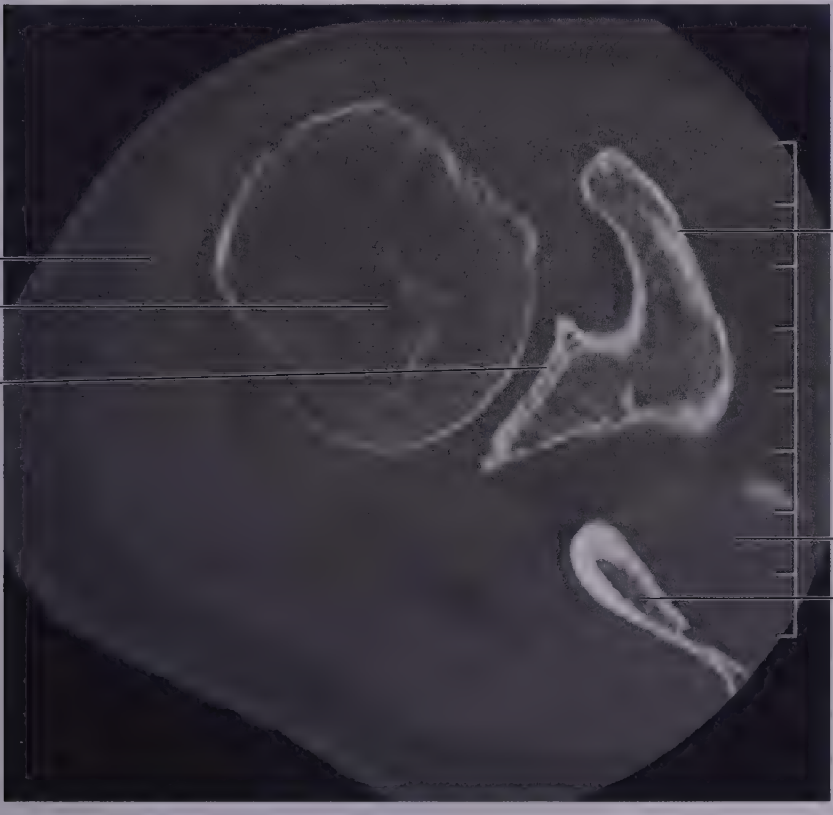
Cutaneous innervation from radial and axillary nerves

See also Plates 263, 431

Coronal proton-density MRI of right glenohumeral joint


Clavicle
Supraspinatus m.
Acromion
Supraspinatus tendon
Glenoid labrum
Head of humerus
Surgical neck of humerus
Body of humerus

Axial CT image of right glenohumeral joint


Coracoid process
Deltoid m.
Head of humerus
Glenoid fossa
Supraspinatus m.
Spine of scapula

ANATOMICAL STRUCTURE	CLINICAL COMMENT	PLATE NUMBERS
Nervous System and Sense Organs		
Long thoracic nerve	Injury may produce "winged scapula" caused by denervation of serratus anterior muscle; can be injured with repetitive overhead motion	436, 438
Axillary nerve	Position of nerve close to surgical neck of humerus makes it vulnerable to injury with fractures or dislocations of humerus; poorly fitting crutches can also compress axillary nerve	441
Median nerve	Compressed in carpal tunnel syndrome, producing pain and paresthesia in lateral three and one-half digits; major risk factors include obesity, pregnancy, diabetes, and hypothyroidism	470, 486
Recurrent branch of median nerve	May be injured in superficial lacerations of palm over thenar eminence	469
Ulnar nerve	Vulnerable to compression or injury where it passes posterior to medial epicondyle of humerus, and at wrist in ulnar tunnel (Guyon's canal)	483, 487
Radial nerve	Vulnerable to compression or injury where it lies against humerus in radial groove (e.g., with humerus fracture); common symptom is wrist drop due to weakness of wrist extensors; poorly fitting crutches can also compress radial nerve	488, 489
Skeletal System		
Clavicle	Most clavicular fractures are caused from fall on outstretched arm or direct trauma delivered to lateral side of shoulder; middle third of clavicle is most commonly fractured; supraclavicular nerve block relieves acute pain associated with fracture	427, 429
Humerus	Proximal humerus, especially surgical neck, is fractured due to low-energy falls in elderly persons and high-energy trauma in young persons; axillary nerve and circumflex humeral arteries can be injured; hematoma from anterior/posterior circumflex humeral artery damage as result of dislocation may complicate reductions; midbody fractures are also relatively common and may affect radial nerve and/or deep brachial artery; distal humerus fractures may affect ulnar nerve medially and radial nerve laterally	427, 428, 430
Ulna	Subcutaneous location of olecranon makes it vulnerable to fracture by direct trauma, especially when elbow is flexed; ulnar styloid process may also be fractured with distal radial fractures	446, 449
Radius	Fractures of distal radius are most common fracture of upper limb (Colles' fracture), typically caused by fall on outstretched hand (FOOSH)	449
Scaphoid bone	Most commonly fractured carpal bone, typically from fall on outstretched hand (FOOSH)	459, 460, 462
Muscular System		
Palmar aponeurosis	Progressive fibrosis may result in nodules and eventually a palpable cord that limits finger extension (Dupuytren's contracture)	469
Rotator cuff muscles	Injuries to this group of muscles can result from acute injury or chronic overuse and are a common cause of shoulder pain and disability	431, 434, 441
Supraspinatus tendon	Most commonly torn rotator cuff tendon	434–436, 441
Biceps brachii tendon	Can rupture from sudden load on muscle when contracting; used in flexor compartment reflex assessing C5 and C6 spinal nerves	440, 442
Long head of biceps brachii muscle	Tendon of long head of biceps brachii muscle can cause shoulder pain from tendinosis of intraarticular portion and can rupture in elderly persons from falls on outstretched arm; when long head has been ruptured, it usually tears from supraglenoid tubercle and retracts down into arm; muscle commonly bulges (Popeye deformity) at midbody of humerus; spontaneous rupture may occur in amyloidosis, infiltrative disease that also causes cardiomyopathy	440

ANATOMICAL STRUCTURE	CLINICAL COMMENT	PLATE NUMBERS
Muscles of posterior compartment of forearm	Repetitive use of muscles arising from common extensor origin can damage tendons and produce pain over lateral epicondyle region (epicondylitis); activities such as swinging tennis racquet and poor technique with hammer can result in "tennis elbow"; muscle most likely involved is extensor carpi radialis brevis	451
Muscles of anterior compartment of forearm	Repetitive use of muscles arising from common flexor origin can damage tendons and produce pain over medial epicondyle region (golfer's elbow)	452, 453
Cardiovascular System		
Median cubital vein	Accessed in cubital fossa for venipuncture	424
Suprascapular, dorsal scapular, and circumflex scapular arteries	Provide collateral circulation around scapula, allowing blood to reach distal part of upper limb if axillary artery is blocked or compressed	437
Brachial artery	During deflation of sphygmomanometer on upper arm, brachial artery is auscultated for Korotkoff sounds to measure systolic and diastolic blood pressure; identified medial to biceps brachii tendon and deep to bicipital aponeurosis in cubital fossa	442, 443
Radial artery	Palpated at lateral aspect of wrist to assess radial pulse; common site of vascular access for percutaneous cardiac procedures, such as angioplasty, and for sampling of arterial blood	14, 443
Ulnar artery	Provides important collateral circulation to hand via palmar arch during catheterization of radial artery; patency is assessed prior to procedure using Allen test, in which both radial and ulnar arteries are compressed, then pressure over ulnar artery is released; return of color to wrist within a few seconds indicates patent ulnar artery	443, 476

*Selections were based largely on clinical data and commonly discussed clinical correlations in macroscopic ("gross") anatomy courses.

Nerves of Brachial Plexus

The roots of the brachial plexus are typically the anterior rami of the C5–T1 spinal nerves. Variation in the spinal nerve contributions to the plexus, and the nerves that arise from this plexus, is common, due to prefixed (high) and postfixed (low) plexuses.

NERVE	ORIGIN	COURSE	BRANCHES	MOTOR	CUTANEOUS
Dorsal scapular nerve	Anterior ramus of C5 spinal nerve	Pierces scalenus medius muscle to run posteriorly and inferiorly on levator scapulae along vertebral border of scapula		Rhomboid major and minor muscles, levator scapulae	
Long thoracic nerve	Anterior rami of C5–C7 spinal nerves	C5–C6 join within scalenus medius muscle, and at 1st rib are joined by C7; runs inferiorly and posterior to brachial plexus and axillary vessels; follows midaxillary line on surface of serratus anterior muscle		Serratus anterior muscle	
Suprascapular nerve	Superior trunk (C5–C6)	Traverses posterior cervical triangle, coursing posterior to inferior belly of omohyoid muscle and border of trapezius muscle to pass through scapular notch deep to superior transverse scapular ligament; continues laterally and then through spinoglenoid notch into infraspinous fossa		Supraspinatus and infraspinatus muscles	
Subclavian nerve	Superior trunk (C5–C6)	Runs inferiorly at distal aspect of anterior rami		Subclavius muscle	
Lateral pectoral nerve	Lateral cord (C5–C7)	Emerges lateral and superficial to axillary artery and vein, coursing just medial to pectoralis minor muscle		Pectoralis major and minor muscles	
Musculocutaneous nerve	Lateral cord (C5–C7)	Emerges at inferior border of pectoralis minor muscle, pierces coracobrachialis muscle to run between brachialis and biceps brachii muscles; just proximal to elbow, pierces deep fascia to continue as lateral antebrachial cutaneous nerve	Muscular branches, lateral antebrachial cutaneous nerve	Anterior compartment of arm	See lateral antebrachial cutaneous nerve
Lateral antebrachial cutaneous nerve	Musculocutaneous nerve	Runs posterior to cephalic vein and divides at elbow joint into anterior and posterior branches that travel along lateral surface of forearm	Anterior and posterior branches		Lateral forearm
Subscapular nerves	Posterior cord (C5–C6)	Upper and lower subscapular nerves emerge to traverse anterior surface of subscapularis muscle; lower subscapular nerve ends in teres major muscle		Teres major and subscapularis muscles	
Thoracodorsal nerve	Posterior cord (C6–C8)	Emerges between upper and lower subscapular nerves, courses with thoracodorsal artery along posterior axillary wall, diving deep to latissimus dorsi muscle		Latissimus dorsi muscle	
Radial nerve	Posterior cord (C5–T1)	Runs anterior to latissimus dorsi muscle to inferior border of teres major muscle, where it accompanies deep brachial artery along radial groove of humerus to course between medial and lateral heads of triceps brachii muscle	Posterior and inferior lateral brachial cutaneous nerves, posterior antebrachial cutaneous nerve, muscular, deep, and superficial branches and posterior interosseous nerve	Triceps brachii, anconeus, and brachioradialis muscles, extensores carpi radiales longus and brevis, supinator (also see posterior interosseous nerve)	Lateral part of dorsum of hand (also see cutaneous branches)
Posterior brachial cutaneous nerve	Radial nerve	Emerges from radial nerve in medial axilla			Posterior part of medial arm

NERVE	ORIGIN	COURSE	BRANCHES	MOTOR	CUTANEOUS
Inferior lateral brachial cutaneous nerve	Radial nerve	Perforates lateral head of triceps brachii muscle below deltoid tuberosity, coursing anteriorly with cephalic vein			Distal part of lateral arm
Posterior antebrachial cutaneous nerve	Radial nerve	Emerges from plane between lateral and medial heads of triceps brachii muscle to become cutaneous			Posterior part of lateral forearm
Posterior interosseous nerve	Deep branch of radial nerve	Continuation of deep radial nerve courses under cover of supinator distally along posterior surface of interosseous membrane of forearm		Posterior compartment of forearm (some exceptions)	
Axillary nerve	Posterior cord (C5–C6)	Passes anterior to subscapularis muscle to exit axilla with posterior circumflex humeral artery through quadrangular space	Muscular branches, superior lateral brachial cutaneous nerve	Deltoid and teres minor muscles	See superior lateral brachial cutaneous nerve
Superior lateral brachial cutaneous nerve	Axillary nerve	Pierces deep fascia at posteroinferior edge of deltoid muscle to become cutaneous			Proximal part of lateral arm
Medial pectoral nerve	Medial cord (C8–T1)	Emerges and runs between axillary artery and vein to pierce pectoralis minor muscle en route to pectoralis major muscle		Pectoralis minor and major muscles	
Medial brachial cutaneous nerve	Medial cord (T1)	Emerges and traverses axilla anterior to latissimus dorsi muscle, running posteromedial with axillary vein, piercing deep fascia to descend with basilic vein	Anterior and posterior branches		Anterior part of medial arm
Medial antebrachial cutaneous nerve	Medial cord (C8–T1)	Emerges medial to axillary artery, traverses axilla to pierce deep fascia supplying anterior arm, and continues on ulnar side of forearm with basilic vein	Anterior and posterior branches		Anterior arm, medial part of forearm
Ulnar nerve	Medial cord (C7–T1)	Emerges medial to axillary artery, continuing medial to brachial artery along medial head of triceps brachii muscle in groove for ulnar nerve between olecranon and medial epicondyle; enters forearm between heads of flexor carpi ulnaris; runs distally between flexor carpi ulnaris and flexor digitorum profundus, giving off dorsal branch before entering hand	Muscular, dorsal, palmar, superficial, and deep branches	Flexor carpi ulnaris, flexor digitorum profundus (medial half), adductor pollicis, hypothenar muscles, dorsal and palmar interosseous muscles, lumbrical muscles (medial two)	Medial part of palm and dorsum of hand, 5th finger and part of 4th
Median nerve	Medial and lateral cords (C6–T1)	Emerges and runs distally with brachial artery to enter forearm between heads of pronator teres; courses distally on deep surface of flexor digitorum superficialis to become superficial at flexor retinaculum of wrist; traverses carpal tunnel deep to flexor retinaculum of wrist	Anterior interosseous nerve, muscular, palmar, recurrent, and common palmar digital branches	Anterior compartment of forearm (*some exceptions*), lumbricals (lateral two), and thenar muscles (also see anterior interosseous nerve)	Lateral part of palm, thumb, 2nd and 3rd fingers, and part of 4th finger
Anterior interosseous nerve	Median nerve	At elbow runs distally with anterior interosseous artery along anterior surface of interosseous membrane of forearm		Flexor pollicis longus, pronator quadratus, flexor digitorum profundus (lateral half)	

Nerves of Brachial Plexus **Table 7.4**

MUSCLE	MUSCLE GROUP	PROXIMAL ATTACHMENT	DISTAL ATTACHMENT	INNERVATION	BLOOD SUPPLY	MAIN ACTIONS
Abductor digiti minimi of hand	Hand	Pisiform bone, tendon of flexor carpi ulnaris	Medial surface of base of proximal phalanx of little finger (5th digit)	Ulnar nerve (deep branch)	Deep palmar branch of ulnar artery	Abducts little finger
Abductor pollicis brevis	Hand	Flexor retinaculum of wrist, tubercles of scaphoid and trapezium bones	Base of proximal phalanx of thumb	Median nerve (recurrent branch)	Superficial palmar branch of radial artery	Abducts thumb
Abductor pollicis longus	Posterior forearm	Posterior surfaces of ulna, radius, and interosseous membrane of forearm	Base of 1st metacarpal	Posterior interosseous nerve	Posterior interosseous artery	Abducts and extends thumb
Adductor pollicis	Hand	*Oblique head:* bases of 2nd and 3rd metacarpals, capitate and adjacent carpal bones *Transverse head:* anterior surface of 3rd metacarpal	Base of proximal phalanx of thumb	Ulnar nerve (deep branch)	Deep palmar arch	Adducts thumb
Anconeus m.	Posterior forearm	Posterior surface of lateral epicondyle of humerus	Lateral surface of olecranon, posterior surface of proximal ulna	Radial nerve	Deep brachial artery	Assists triceps brachii m. in extending elbow
Biceps brachii m.	Anterior arm	*Long head:* supraglenoid tubercle of scapula *Short head:* coracoid process of scapula	Radial tuberosity, fascia of forearm (via bicipital aponeurosis)	Musculocutaneous nerve	Brachial artery	Flexes and supinates forearm
Brachialis m.	Anterior arm	Distal half of anterior surface of humerus	Coronoid process and tuberosity of ulna	Musculocutaneous and radial nerves	Radial recurrent and brachial arteries	Flexes forearm
Brachioradialis m.	Posterior forearm	Proximal two thirds of lateral supracondylar ridge of humerus	Lateral surface of distal end of radius	Radial nerve	Radial recurrent artery	Weak flexion of forearm when forearm is in midpronation
Coracobrachialis m.	Anterior arm	Coracoid process of scapula	Middle one third of medial surface of humerus	Musculocutaneous nerve	Brachial artery	Flexes and adducts arm
Deltoid m.	Shoulder	*Clavicular part:* lateral one third of clavicle *Acromial part:* acromion *Spinous part:* spine of scapula	Deltoid tuberosity of humerus	Axillary nerve	Posterior circumflex humeral artery Deltoid branch of thoraco-acromial artery	*Clavicular part:* flexes and medially rotates arm *Acromial part:* abducts arm beyond initial 15 degrees done by supraspinatus m. *Spinous part:* extends and laterally rotates arm
Dorsal interosseous mm. of hand	Hand	Facing surfaces of adjacent metacarpal bones	Bases of proximal phalanges, and extensor expansions of digits 2–4	Ulnar nerve (deep branch)	Deep palmar arch	Abduct digits; flex digits at metacarpophalangeal joint and extend interphalangeal joints
Extensor carpi radialis brevis	Posterior forearm	Lateral epicondyle of humerus	Bases of 3rd and 2nd metacarpal bones	Radial nerve (deep branch)	Radial and radial recurrent arteries	Extends and abducts hand
Extensor carpi radialis longus	Posterior forearm	Distal one third of lateral supracondylar ridge of humerus	Base of 2nd metacarpal	Radial nerve	Radial and radial recurrent arteries	Extends and abducts hand

Table 7.5

MUSCLE	MUSCLE GROUP	PROXIMAL ATTACHMENT	DISTAL ATTACHMENT	INNERVATION	BLOOD SUPPLY	MAIN ACTIONS
Extensor carpi ulnaris	Posterior forearm	Lateral epicondyle of humerus, posterior border of ulna	Base of 5th metacarpal bone	Posterior interosseous nerve	Posterior interosseous artery	Extends and adducts hand
Extensor digiti minimi	Posterior forearm	Lateral epicondyle of humerus	Extensor expansion of little finger	Posterior interosseous nerve	Posterior interosseous artery	Extends 5th digit
Extensor digitorum	Posterior forearm	Lateral epicondyle of humerus	Extensor expansions of digits 2–5	Posterior interosseous nerve	Posterior interosseous artery	Extends medial four metacarpophalangeal joints, assists in wrist extension
Extensor indicis	Posterior forearm	Posterior surfaces of ulna and interosseous membrane of forearm	Extensor expansion of 2nd digit	Posterior interosseous nerve	Posterior interosseous artery	Extends 2nd digit and helps extend hand
Extensor pollicis brevis	Posterior forearm	Posterior surfaces of radius and interosseous membrane of forearm	Dorsal surface of base of proximal phalanx of thumb	Posterior interosseous nerve	Posterior interosseous artery	Extends proximal phalanx of thumb
Extensor pollicis longus	Posterior forearm	Posterior surfaces of middle one third of ulna and interosseous membrane of forearm	Dorsal surface of base of distal phalanx of thumb	Posterior interosseous nerve	Posterior interosseous artery	Extends distal phalanx of thumb
Flexor carpi radialis	Anterior forearm	Medial epicondyle of humerus	Base of 2nd metacarpal bone	Median nerve	Radial artery	Flexes and abducts hand
Flexor carpi ulnaris	Anterior forearm	*Superficial head:* medial epicondyle of humerus *Deep head:* olecranon and posterior border of ulna	Pisiform bone, hook of hamate bone, base of 5th metacarpal bone	Ulnar nerve	Posterior ulnar recurrent artery	Flexes and adducts hand
Flexor digiti minimi of hand	Hand	Flexor retinaculum of wrist, hook of hamate bone	Medial surface of base of proximal phalanx of little finger	Ulnar nerve (deep branch)	Deep palmar branch of ulnar artery	Flexes proximal phalanx of little finger
Flexor digitorum profundus	Anterior forearm	Medial and anterior surfaces of proximal three fourths of ulna, interosseous membrane of forearm	Palmar surfaces of bases of distal phalanges of digits 2–5	Medial part: ulnar nerve Lateral part: median nerve	Anterior interosseous and ulnar arteries	Flexes distal phalanges of medial four digits, assists with flexion of hand
Flexor digitorum superficialis	Anterior forearm	*Humeroulnar head:* medial epicondyle of humerus, coronoid process of ulna, ulnar collateral ligament *Radial head:* anterior surface of proximal radius	Bodies of middle phalanges of medial four digits	Median nerve	Ulnar and radial arteries	Flexes middle and proximal phalanges of medial four digits, flexes hand
Flexor pollicis brevis	Hand	*Superficial head:* flexor retinaculum, tubercle of trapezium bone *Deep head:* trapezoid and capitate bones	Lateral surface of base of proximal phalanx of thumb	Superficial head: median nerve (recurrent branch) Deep head: ulnar nerve (deep branch)	Superficial palmar branch of radial artery	Flexes proximal phalanx of thumb
Flexor pollicis longus	Anterior forearm	Anterior surfaces of radius and interosseous membrane	Palmar base of distal phalanx of thumb	Anterior interosseous nerve	Anterior interosseous artery	Flexes thumb

Continued

MUSCLE	MUSCLE GROUP	PROXIMAL ATTACHMENT	DISTAL ATTACHMENT	INNERVATION	BLOOD SUPPLY	MAIN ACTIONS
Infraspinatus m.	Shoulder	Infraspinous fossa of scapula, infraspinatus fascia	Greater tubercle of humerus	Suprascapular nerve	Suprascapular artery	Lateral rotation of arm
Lumbrical mm. of hand	Hand	Tendons of flexor digitorum profundus	Lateral sides of extensor expansions of digits 2–5	*Lateral two:* median nerve (digital branches) *Medial two:* ulnar nerve (deep branch)	Superficial and deep palmar arches	Extend digits, flex metacarpophalangeal joints
Opponens digiti minimi m. of hand	Hand	Flexor retinaculum of wrist, hook of hamate bone	Palmar surface of 5th metacarpal bone	Ulnar nerve (deep branch)	Deep palmar branch of ulnar artery	Draws 5th metacarpal bone anteriorly and rotates it to face thumb
Opponens pollicis m.	Hand	Flexor retinaculum of wrist, tubercle of trapezium bone	Lateral surface of 1st metacarpal bone	Median nerve (recurrent branch)	Superficial palmar branch of radial artery	Draws 1st metacarpal forward and rotates it medially
Palmar interosseous mm.	Hand	Palmar surfaces of metacarpal bones 2, 4, and 5	Bases of proximal phalanges and extensor expansions of digits 2, 4, and 5	Ulnar nerve (deep branch)	Deep palmar arch	Adduct digits; flex digits and extend interphalangeal joints
Palmaris brevis m.	Hand	Palmar aponeurosis, flexor retinaculum	Skin of medial border of palm	Ulnar nerve (superficial branch)	Superficial palmar arch	Deepens hollow of hand, assists grip
Palmaris longus m	Anterior forearm	Medial epicondyle of humerus	Distal half of flexor retinaculum of wrist, palmar aponeurosis	Median nerve	Posterior ulnar recurrent artery	Flexes hand and tenses palmar aponeurosis
Pronator quadratus	Anterior forearm	Distal one fourth of anterior surface of ulna	Distal one fourth of anterior surface of radius	Anterior interosseous nerve	Anterior interosseous artery	Pronates forearm
Pronator teres	Anterior forearm	*Humeral head:* medial epicondyle of humerus *Ulnar head:* coronoid process of ulna	Middle part of lateral surface of radius	Median nerve	Anterior ulnar recurrent artery	Pronates forearm and flexes elbow
Subscapularis m.	Shoulder	Subscapular fossa	Lesser tubercle of humerus	Upper and lower subscapular nerves	Subscapular and lateral thoracic arteries	Medially rotates and adducts arm; helps hold humeral head in glenoid fossa
Supinator	Posterior forearm	Lateral epicondyle of humerus, radial collateral and annular ligaments, supinator fossa, and crest of ulna	Lateral, posterior, and anterior surfaces of proximal one third of radius	Radial nerve	Radial recurrent and posterior interosseous arteries	Supinates forearm
Supraspinatus m.	Shoulder	Supraspinous fossa of scapula, supraspinatus fascia	Greater tubercle of humerus	Suprascapular nerve	Suprascapular artery	Initiates arm abduction
Teres major m.	Shoulder	Posterior surface of inferior angle of scapula	Medial lip of intertubercular sulcus of humerus	Lower subscapular nerve	Circumflex scapular artery	Adducts and medially rotates arm
Teres minor m.	Shoulder	Superior two-thirds of posterior surface of lateral border of scapula	Greater tubercle of humerus	Axillary nerve	Circumflex scapular artery	Laterally rotates arm

MUSCLE	MUSCLE GROUP	PROXIMAL ATTACHMENT	DISTAL ATTACHMENT	INNERVATION	BLOOD SUPPLY	MAIN ACTIONS
Triceps brachii m.	Posterior arm	*Long head:* infraglenoid tubercle of scapula *Lateral head:* proximal half of posterior humerus *Medial head:* distal two thirds of medial and posterior humerus	Posterior surface of olecranon	Radial nerve	Deep brachial artery	Extends forearm; long head stabilizes head of abducted humerus and extends and adducts arm

Variations in spinal nerve contributions to the innervation of muscles, their arterial supply, their attachments, and their actions are common themes in human anatomy. Therefore, expect differences between texts and realize that anatomical variation is normal.

LOWER LIMB 8

Surface Anatomy 491–494
Hip, Buttock, and Thigh 495–515
Knee 516–523
Leg 524–534
Ankle and Foot 535–549
Nerves 550–554
Regional Imaging 555–556
Structures with High Clinical Significance Tables 8.1–8.2
Nerves of Lumbosacral Plexus Tables 8.3–8.4
Muscles Tables 8.5–8.8
Electronic Bonus Plates BP 103–BP 112

ELECTRONIC BONUS PLATES

BP 103 Arteries of Knee and Foot

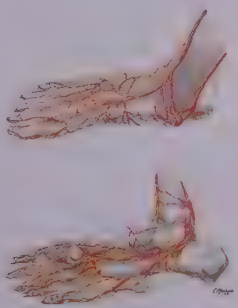
BP 104 Cross-Sectional Anatomy of Hip: Axial View

BP 105 Arteries of Thigh and Knee

BP 106 Leg: Serial Cross Sections

BP 107 Osteology of Knee

BP 108 Knee Radiograph: Lateral View

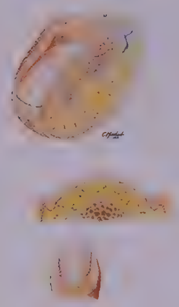


BP 109 Foot: Nerves and Arteries

BP 110 Cross-Sectional Anatomy of Ankle and Foot

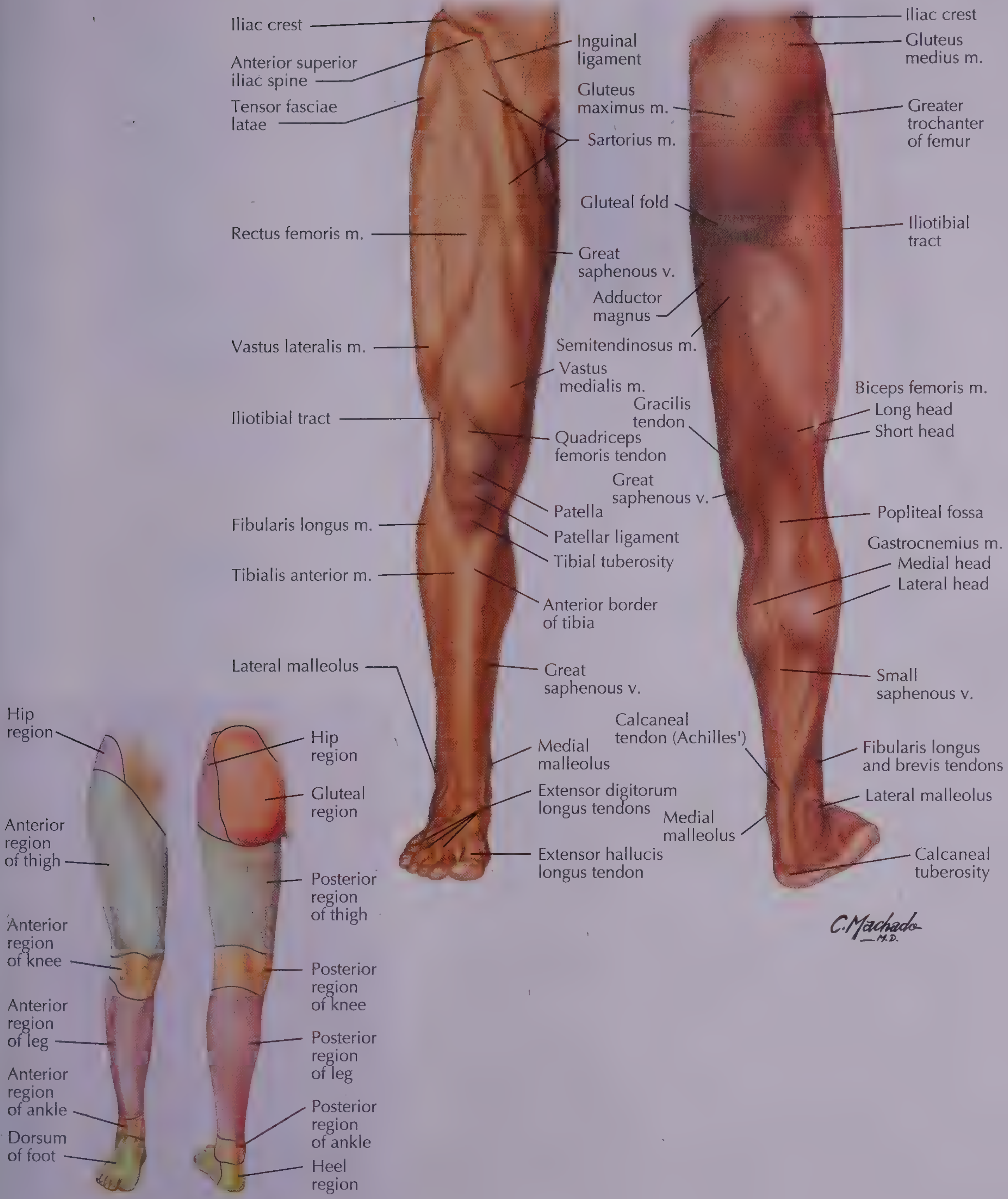
ELECTRONIC BONUS PLATES—*cont'd*

BP 111 Cross-Sectional Anatomy of Ankle and Foot (continued)



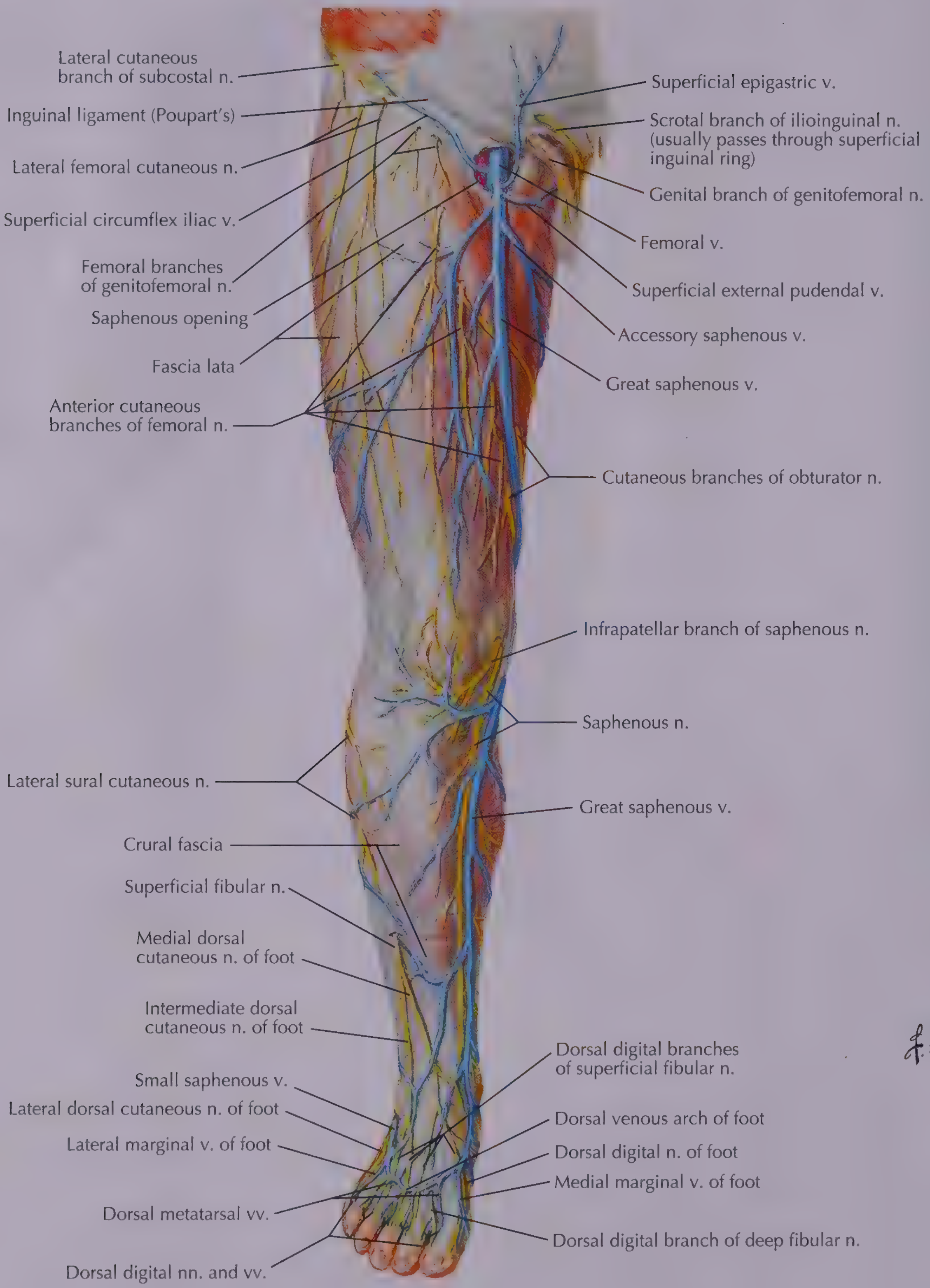
BP 112 Anatomy of Toenail

See also Plates 5, 11, 492, 493


Iliac crest
Anterior superior iliac spine
Tensor fasciae latae
Rectus femoris m.
Vastus lateralis m.
Iliotibial tract
Fibularis longus m.
Tibialis anterior m.
Lateral malleolus
Inguinal ligament
Gluteus maximus m.
Sartorius m.
Gluteal fold
Great saphenous v.
Adductor magnus
Semitendinosus m.
Vastus medialis m.
Gracilis tendon
Quadriceps femoris tendon
Great saphenous v.
Patella
Patellar ligament
Tibial tuberosity
Anterior border of tibia
Great saphenous v.
Calcaneal tendon (Achilles')
Medial malleolus
Extensor digitorum longus tendons
Medial malleolus
Extensor hallucis longus tendon
Iliac crest
Gluteus medius m.
Greater trochanter of femur
Iliotibial tract
Biceps femoris m.
Long head
Short head
Popliteal fossa
Gastrocnemius m.
Medial head
Lateral head
Small saphenous v.
Fibularis longus and brevis tendons
Lateral malleolus
Calcaneal tuberosity
C. Machado M.D.
Hip region
Anterior region of thigh
Anterior region of knee
Anterior region of leg
Anterior region of ankle
Dorsum of foot
Hip region
Gluteal region
Posterior region of thigh
Posterior region of knee
Posterior region of leg
Posterior region of ankle
Heel region

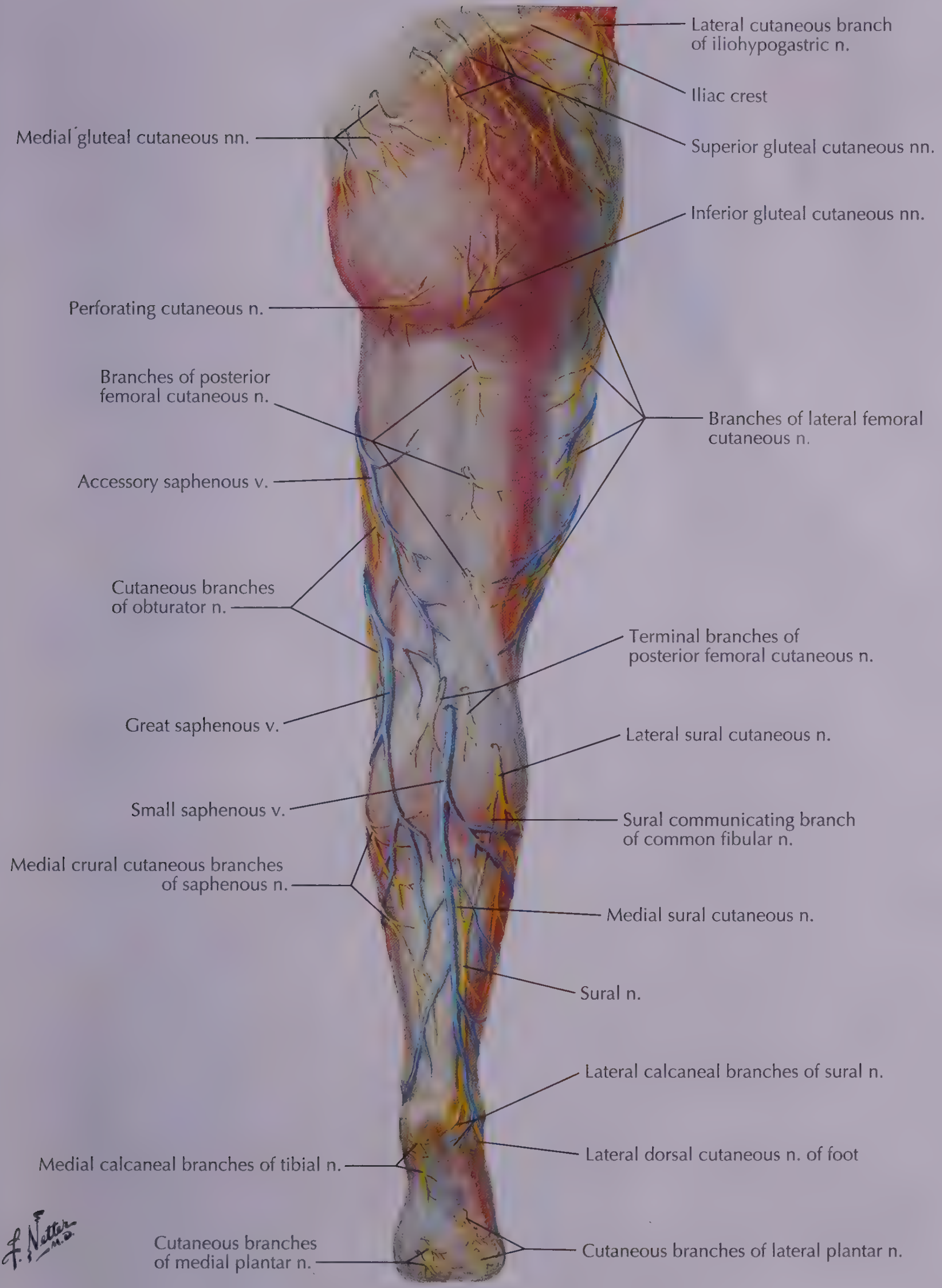
Superficial Veins of Lower Limb: Anterior View

See also Plates 523, 550, 551, 554


Lateral cutaneous branch of subcostal n.
Inguinal ligament (Poupart's)
Lateral femoral cutaneous n.
Superficial circumflex iliac v.
Femoral branches of genitofemoral n.
Saphenous opening
Fascia lata
Anterior cutaneous branches of femoral n.
Lateral sural cutaneous n.
Crural fascia
Superficial fibular n.
Medial dorsal cutaneous n. of foot
Intermediate dorsal cutaneous n. of foot
Small saphenous v.
Lateral dorsal cutaneous n. of foot
Lateral marginal v. of foot
Dorsal metatarsal vv.
Dorsal digital nn. and vv.
Superficial epigastric v.
Scrotal branch of ilioinguinal n. (usually passes through superficial inguinal ring)
Genital branch of genitofemoral n.
Femoral v.
Superficial external pudendal v.
Accessory saphenous v.
Great saphenous v.
Cutaneous branches of obturator n.
Infrapatellar branch of saphenous n.
Saphenous n.
Great saphenous v.
Dorsal digital branches of superficial fibular n.
Dorsal venous arch of foot
Dorsal digital n. of foot
Medial marginal v. of foot
Dorsal digital branch of deep fibular n.

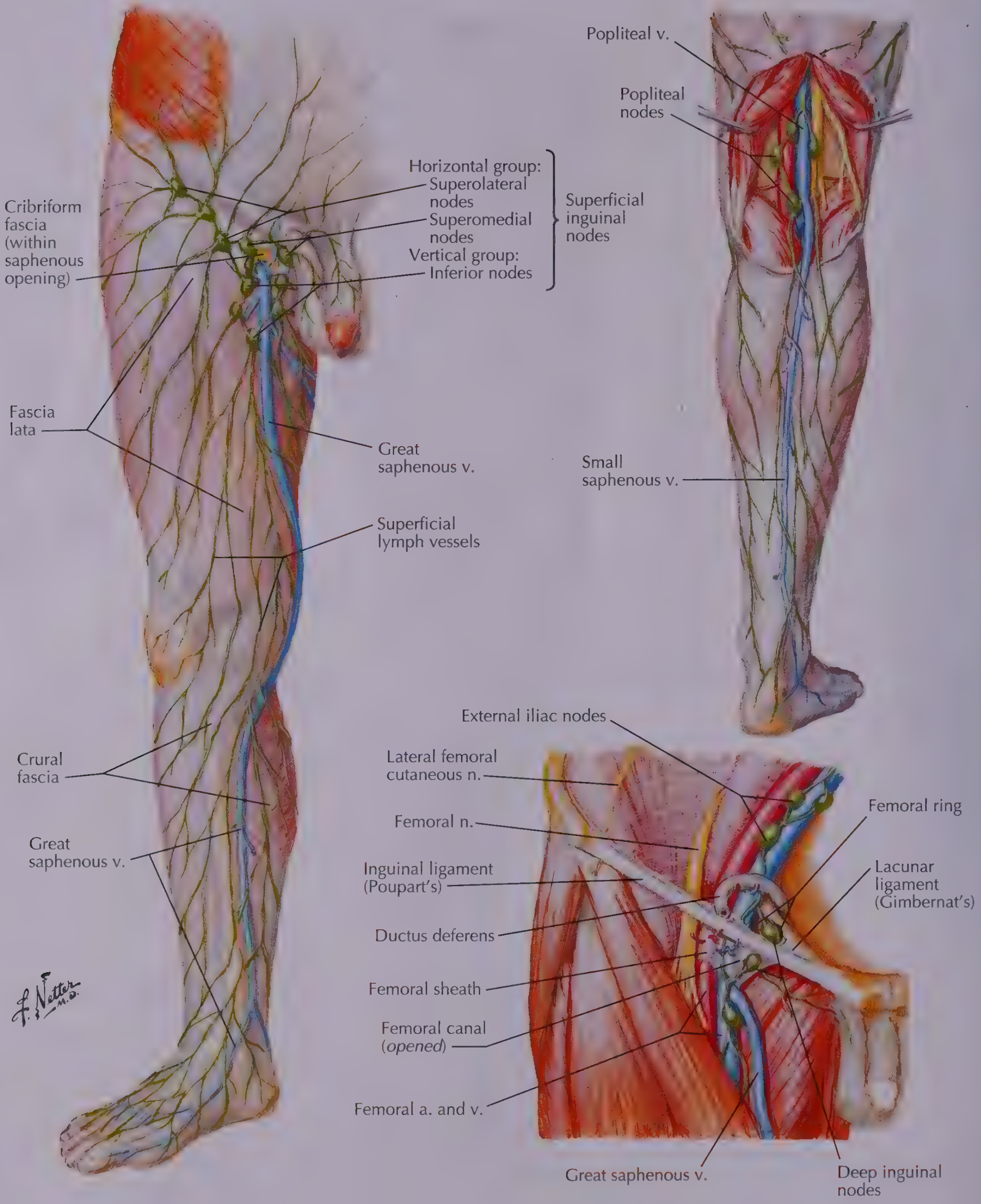
Superficial Veins of Lower Limb: Posterior View

See also Plates 523, 552, 553

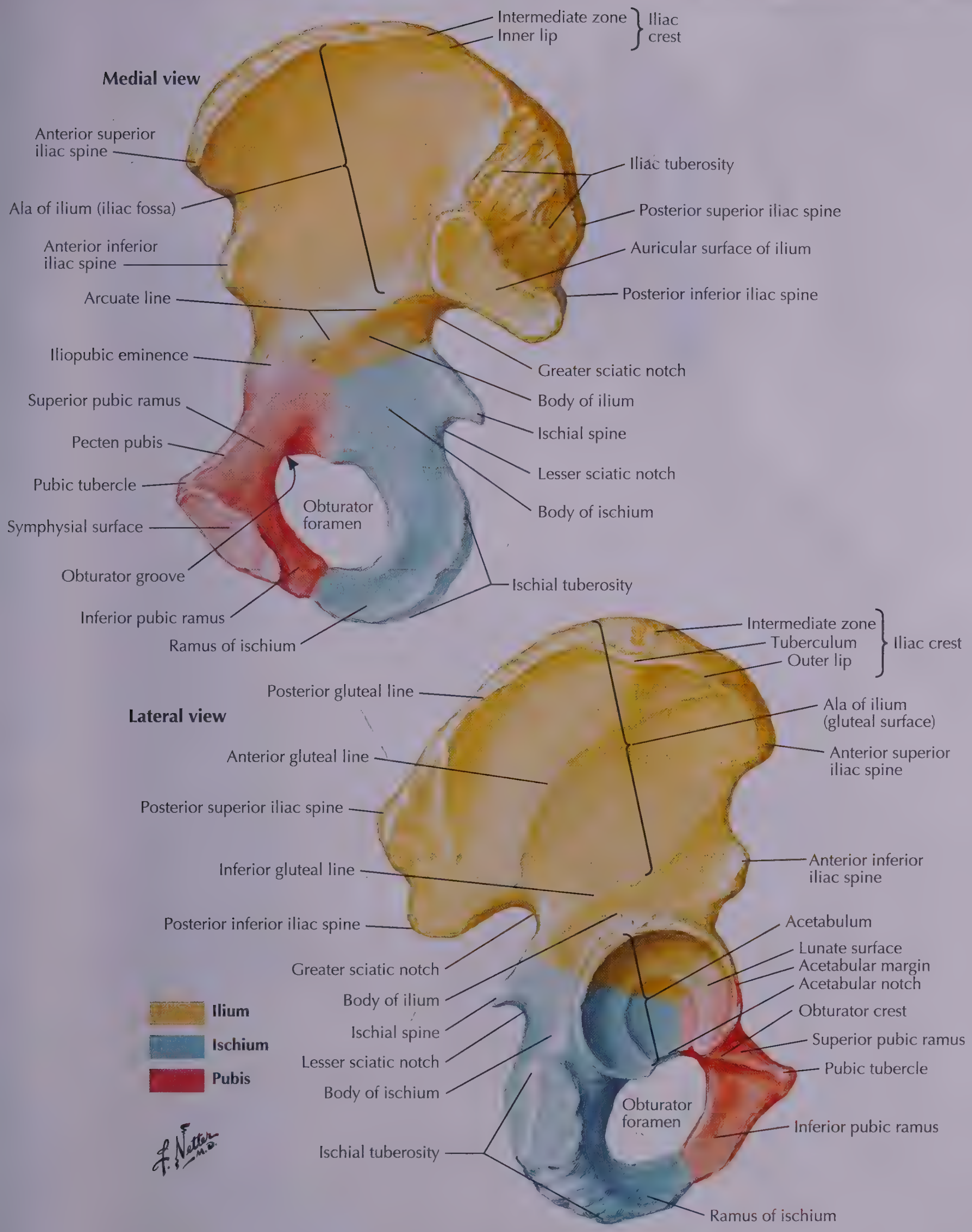

Lateral cutaneous branch of iliohypogastric n.
Iliac crest
Medial gluteal cutaneous nn.
Superior gluteal cutaneous nn.
Inferior gluteal cutaneous nn.
Perforating cutaneous n.
Branches of posterior femoral cutaneous n.
Branches of lateral femoral cutaneous n.
Accessory saphenous v.
Cutaneous branches of obturator n.
Terminal branches of posterior femoral cutaneous n.
Great saphenous v.
Lateral sural cutaneous n.
Small saphenous v.
Sural communicating branch of common fibular n.
Medial crural cutaneous branches of saphenous n.
Medial sural cutaneous n.
Sural n.
Lateral calcaneal branches of sural n.
Lateral dorsal cutaneous n. of foot
Medial calcaneal branches of tibial n.
Cutaneous branches of medial plantar n.
Cutaneous branches of lateral plantar n.

Lymph Vessels and Lymph Nodes of Lower Limb

See also Plates 409, 410

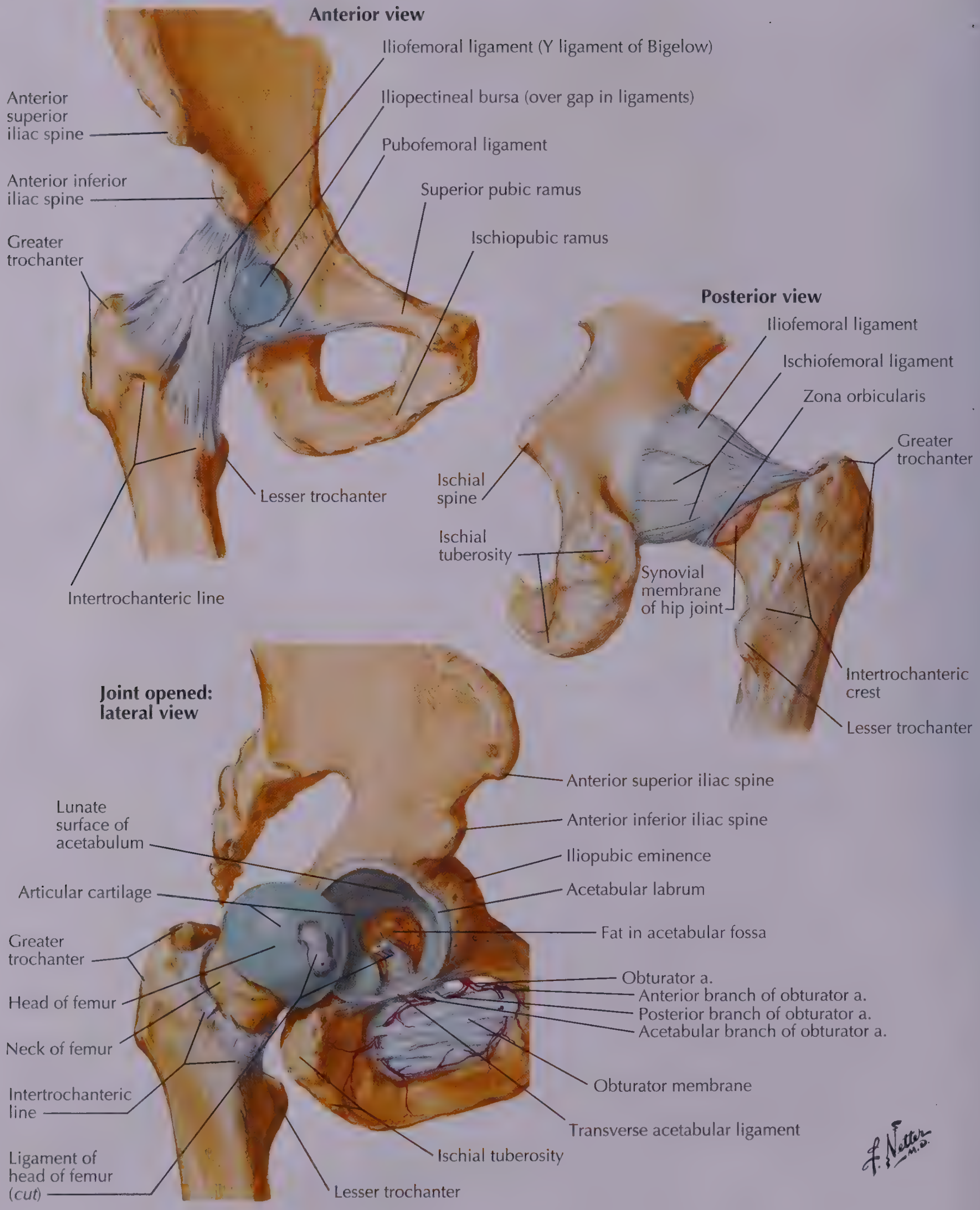

Horizontal group:
Superolateral nodes
Superomedial nodes
Vertical group:
Inferior nodes
Superficial inguinal nodes
Cribriform fascia (within saphenous opening)
Fascia lata
Great saphenous v.
Superficial lymph vessels
Crural fascia
Great saphenous v.
Popliteal v.
Popliteal nodes
Small saphenous v.
External iliac nodes
Lateral femoral cutaneous n.
Femoral n.
Femoral ring
Lacunar ligament (Gimbernat's)
Inguinal ligament (Poupart's)
Ductus deferens
Femoral sheath
Femoral canal (*opened*)
Femoral a. and v.
Great saphenous v.
Deep inguinal nodes

See also Plates 268, 356, 357


Medial view
Intermediate zone
Inner lip
Iliac crest
Anterior superior iliac spine
Ala of ilium (iliac fossa)
Anterior inferior iliac spine
Arcuate line
Iliopubic eminence
Superior pubic ramus
Pecten pubis
Pubic tubercle
Symphysial surface
Obturator groove
Inferior pubic ramus
Ramus of ischium
Obturator foramen
Iliac tuberosity
Posterior superior iliac spine
Auricular surface of ilium
Posterior inferior iliac spine
Greater sciatic notch
Body of ilium
Ischial spine
Lesser sciatic notch
Body of ischium
Ischial tuberosity
Lateral view
Intermediate zone
Tuberculum
Outer lip
Iliac crest
Posterior gluteal line
Anterior gluteal line
Posterior superior iliac spine
Inferior gluteal line
Posterior inferior iliac spine
Greater sciatic notch
Body of ilium
Ischial spine
Lesser sciatic notch
Body of ischium
Ischial tuberosity
Ala of ilium (gluteal surface)
Anterior superior iliac spine
Anterior inferior iliac spine
Acetabulum
Lunate surface
Acetabular margin
Acetabular notch
Obturator crest
Superior pubic ramus
Pubic tubercle
Obturator foramen
Inferior pubic ramus
Ramus of ischium
Ilium
Ischium
Pubis
F. Netter M.D.

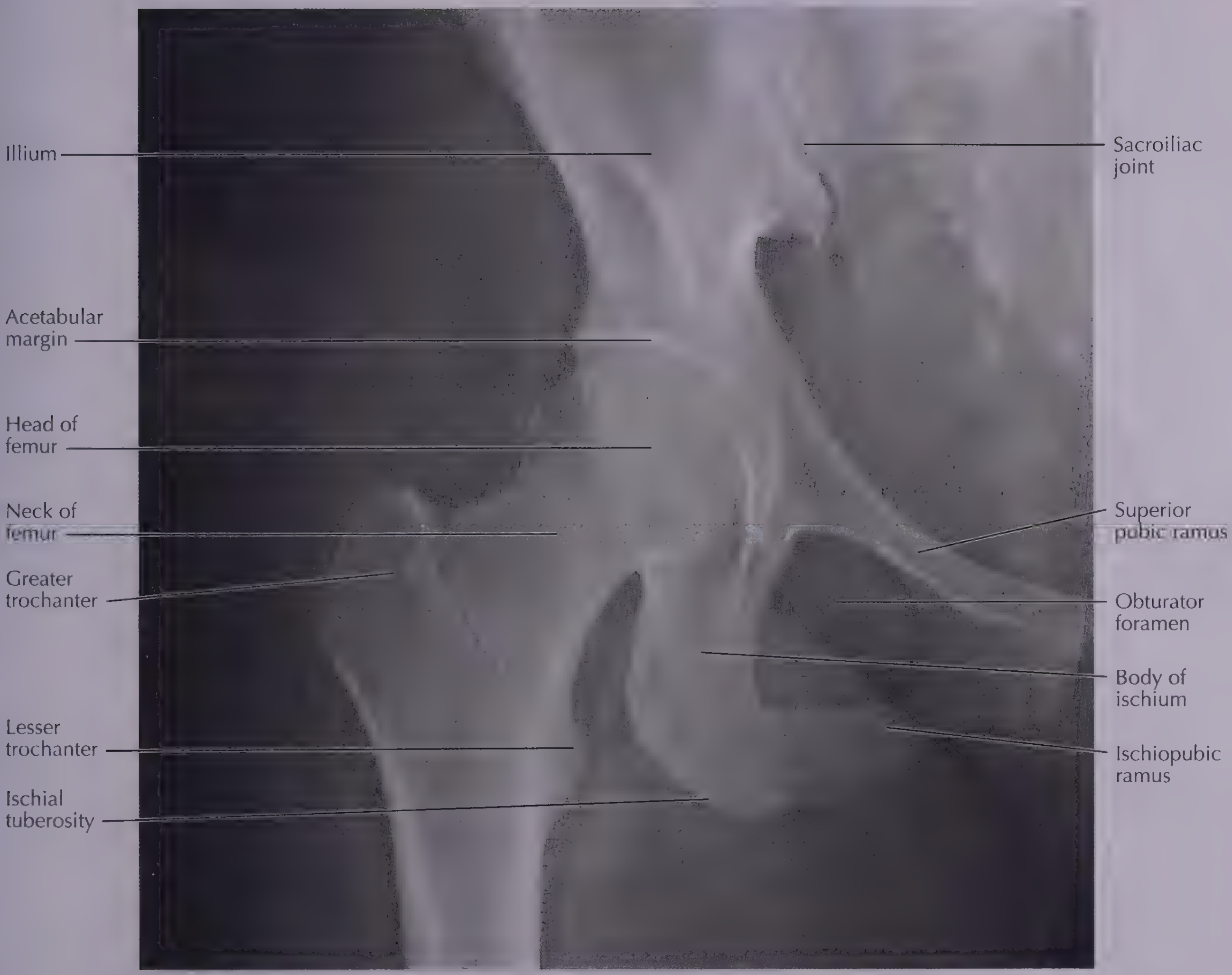
Hip Joint

See also Plates 353, 357, BP 11


Anterior view
Iliofemoral ligament (Y ligament of Bigelow)
Iliopectineal bursa (over gap in ligaments)
Pubofemoral ligament
Superior pubic ramus
Ischiopubic ramus
Anterior superior iliac spine
Anterior inferior iliac spine
Greater trochanter
Lesser trochanter
Intertrochanteric line
Posterior view
Iliofemoral ligament
Ischiofemoral ligament
Zona orbicularis
Greater trochanter
Ischial spine
Ischial tuberosity
Synovial membrane of hip joint
Intertrochanteric crest
Lesser trochanter
Joint opened: lateral view
Anterior superior iliac spine
Anterior inferior iliac spine
Iliopubic eminence
Acetabular labrum
Fat in acetabular fossa
Obturator a.
Anterior branch of obturator a.
Posterior branch of obturator a.
Acetabular branch of obturator a.
Obturator membrane
Transverse acetabular ligament
Ischial tuberosity
Lesser trochanter
Lunate surface of acetabulum
Articular cartilage
Greater trochanter
Head of femur
Neck of femur
Intertrochanteric line
Ligament of head of femur (*cut*)
F. Netter M.D.

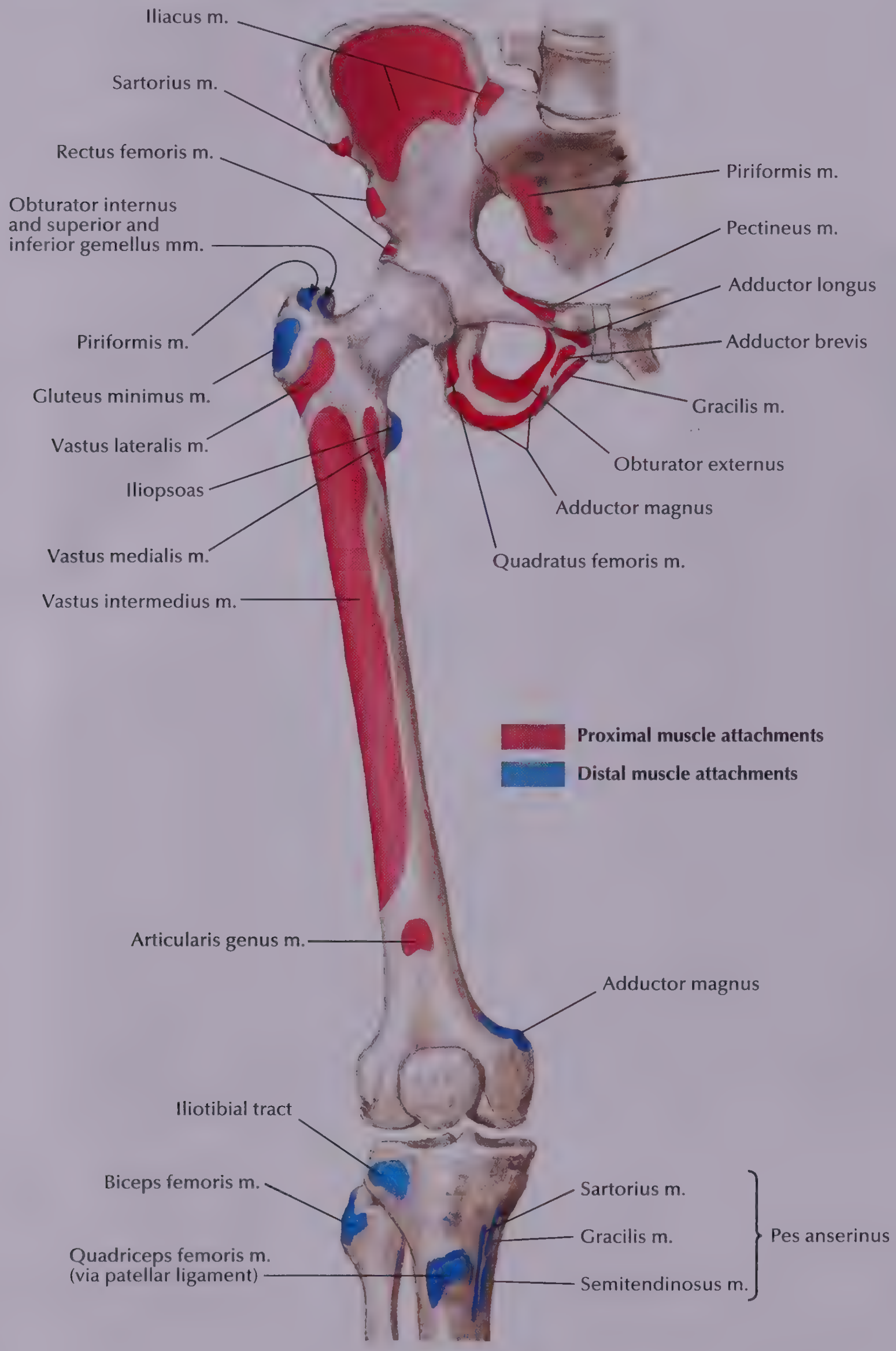
Hip Joint: Anteroposterior Radiograph

See also Plates 354, 496, 498


Illium
Acetabular margin
Head of femur
Neck of femur
Greater trochanter
Lesser trochanter
Ischial tuberosity
Sacroiliac joint
Superior pubic ramus
Obturator foramen
Body of ischium
Ischiopubic ramus

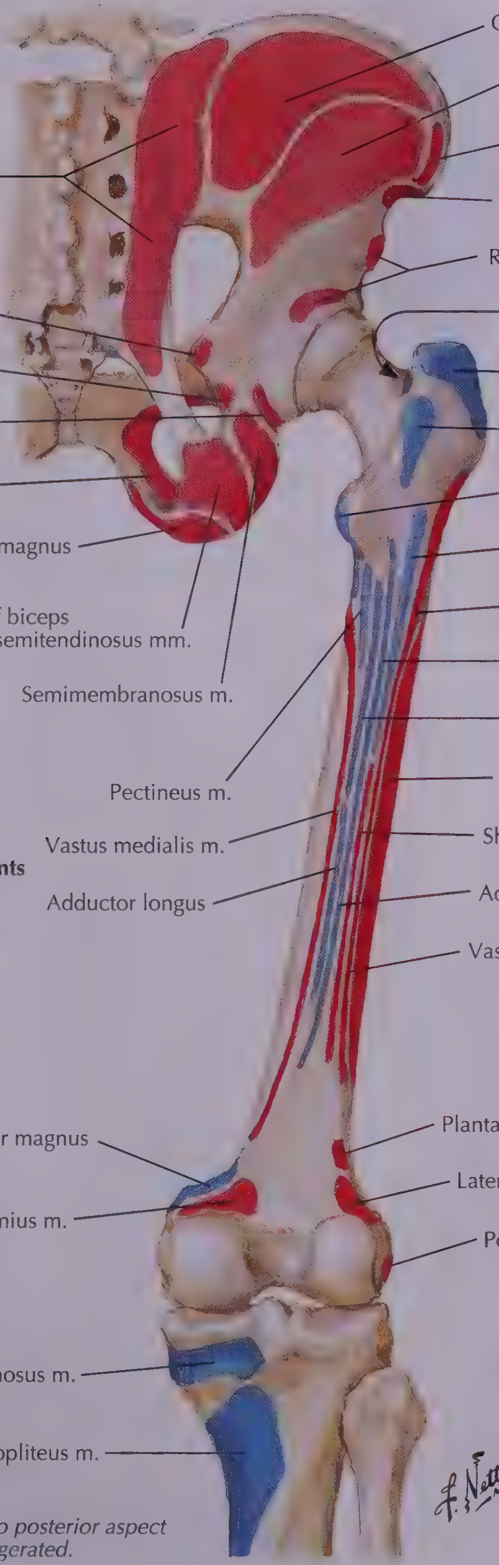
Attachments of Muscles of Hip and Thigh: Anterior View

See also Plates 497, 555


Iliacus m.
Sartorius m.
Rectus femoris m.
Obturator internus and superior and inferior gemellus mm.
Piriformis m.
Gluteus minimus m.
Vastus lateralis m.
Iliopsoas
Vastus medialis m.
Vastus intermedius m.
Piriformis m.
Pectineus m.
Adductor longus
Adductor brevis
Gracilis m.
Obturator externus
Adductor magnus
Quadratus femoris m.
🟥 Proximal muscle attachments
🟦 Distal muscle attachments
Articularis genus m.
Adductor magnus
Iliotibial tract
Biceps femoris m.
Quadriceps femoris m. (via patellar ligament)
Sartorius m.
Gracilis m.
Semitendinosus m.
Pes anserinus

Attachments of Muscles of Hip and Thigh: Posterior View

See also Plate 497


Gluteus maximus m.
Superior gemellus m.
Inferior gemellus m.
Quadratus femoris m.
Obturator internus
Adductor magnus
Long head of biceps femoris and semitendinosus mm.
Semimembranosus m.
Pectineus m.
Vastus medialis m.
Adductor longus
Adductor magnus
Medial head of gastrocnemius m.
Semimembranosus m.
Popliteus m.
Gluteus medius m.
Gluteus minimus m.
Tensor fasciae latae
Sartorius m.
Rectus femoris m.
Obturator externus
Gluteus medius m.
Quadratus femoris m.
Iliopsoas
Gluteus maximus m.
Vastus lateralis m.
Adductor magnus
Adductor brevis
Vastus intermedius m.
Short head of biceps femoris m.
Adductor magnus
Vastus lateralis m.
Plantaris m.
Lateral head of gastrocnemius m.
Popliteus m.
F. Netter M.D.

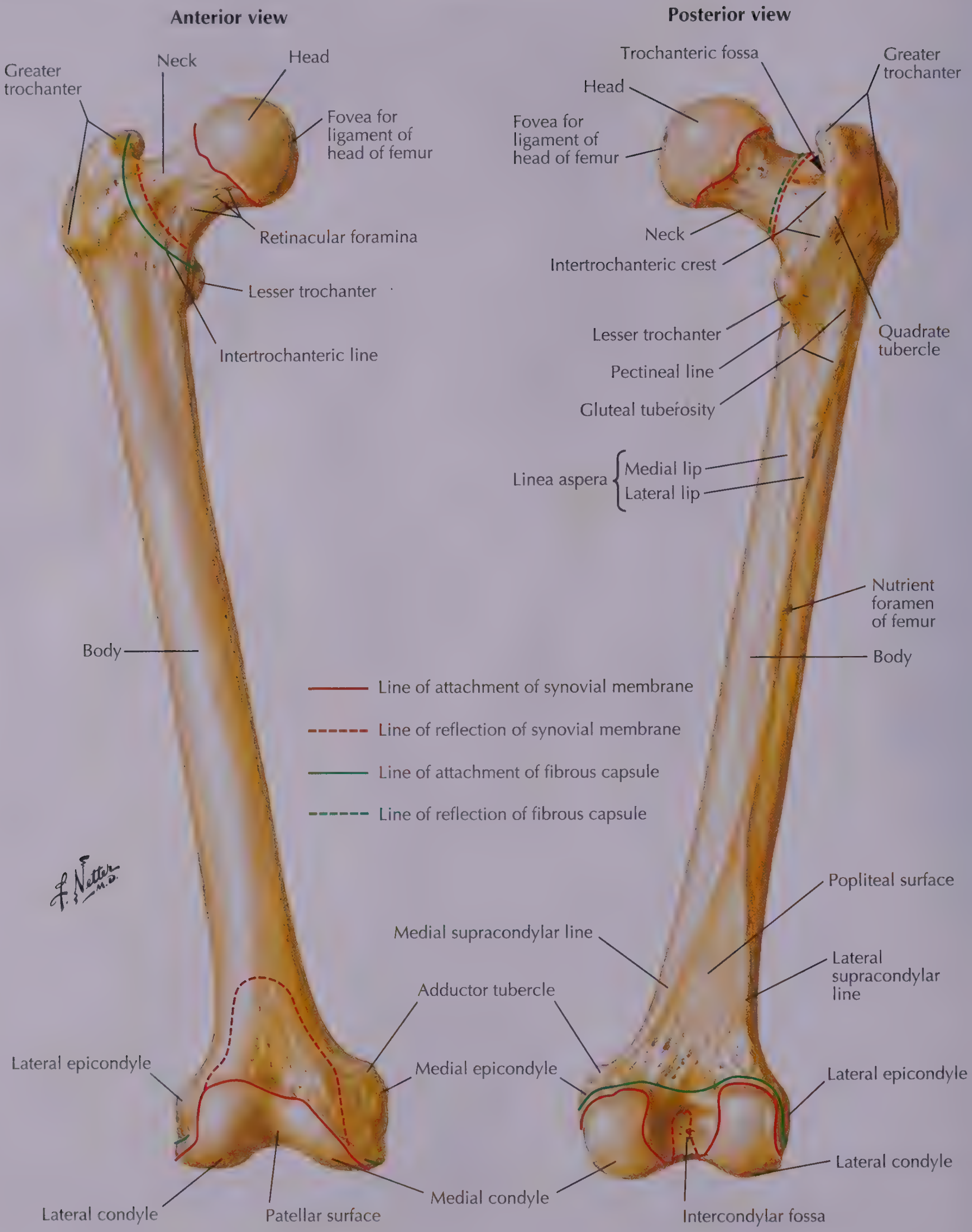
🟥 **Proximal muscle attachments**

🟦 **Distal muscle attachments**

Note: Width of zone of attachments to posterior aspect of femur (linea aspera) is greatly exaggerated.

Femur

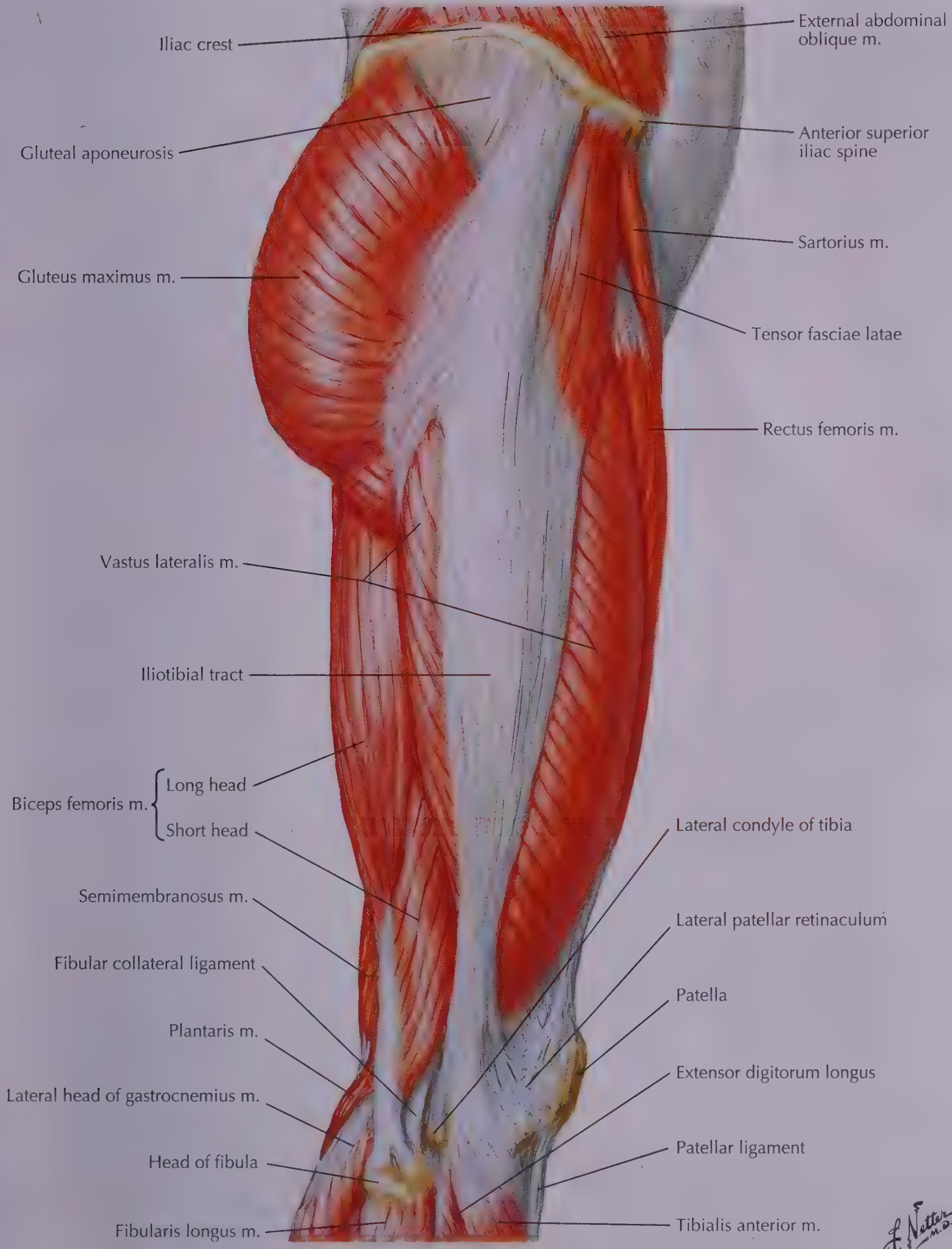
See also Plates 514, BP 9


Anterior view

Posterior view
Greater trochanter
Neck
Head
Fovea for ligament of head of femur
Retinacular foramina
Lesser trochanter
Intertrochanteric line
Body
Lateral epicondyle
Adductor tubercle
Medial epicondyle
Lateral condyle
Patellar surface
Medial condyle
Trochanteric fossa
Head
Greater trochanter
Fovea for ligament of head of femur
Neck
Intertrochanteric crest
Lesser trochanter
Pectineal line
Gluteal tuberosity
Quadrate tubercle
Linea aspera
Medial lip
Lateral lip
Nutrient foramen of femur
Body
Line of attachment of synovial membrane
Line of reflection of synovial membrane
Line of attachment of fibrous capsule
Line of reflection of fibrous capsule
F. Netter M.D.
Popliteal surface
Medial supracondylar line
Lateral supracondylar line
Adductor tubercle
Medial epicondyle
Lateral epicondyle
Lateral condyle
Medial condyle
Intercondylar fossa

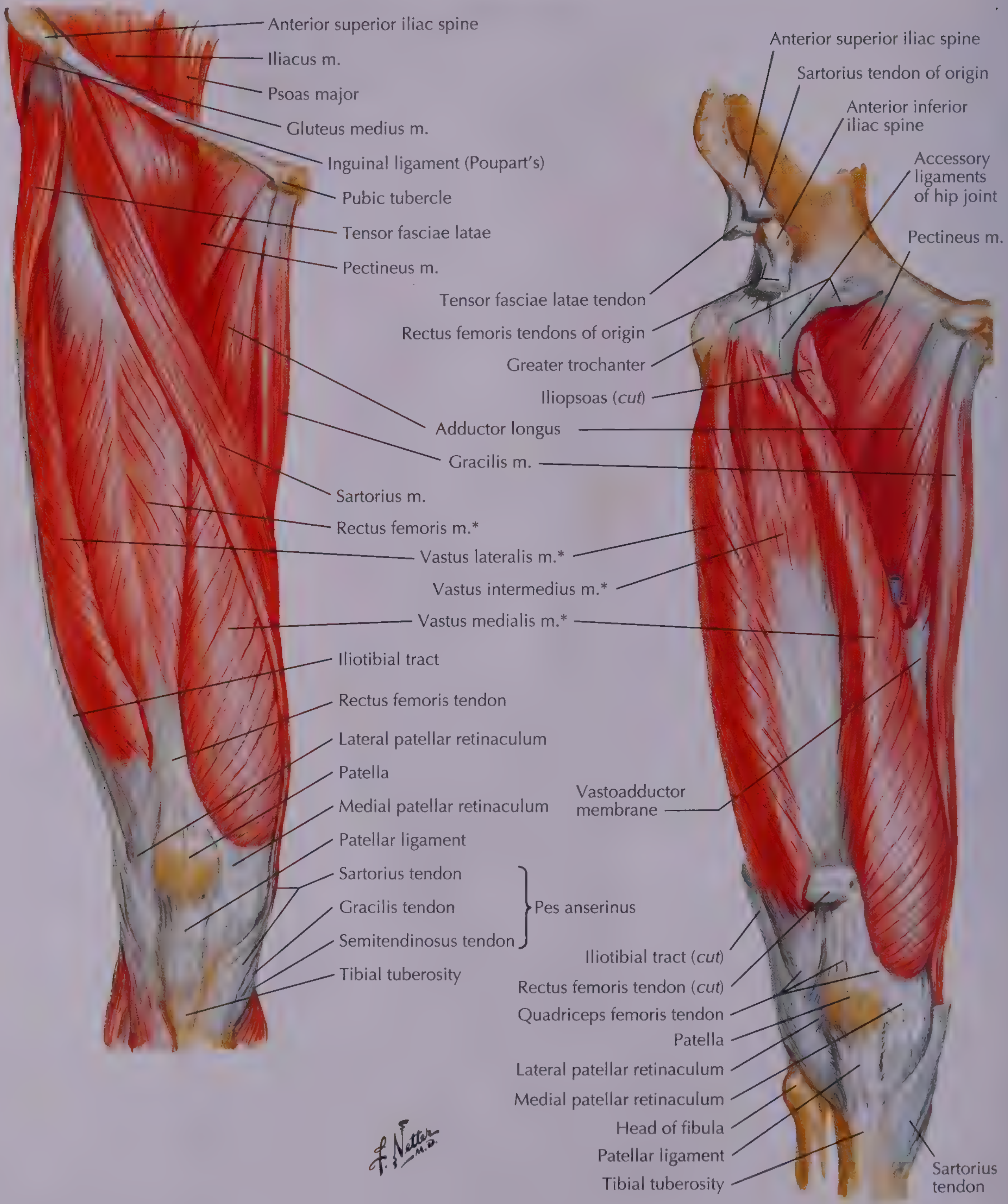
Muscles of Hip and Thigh: Lateral View

See also Plate 515

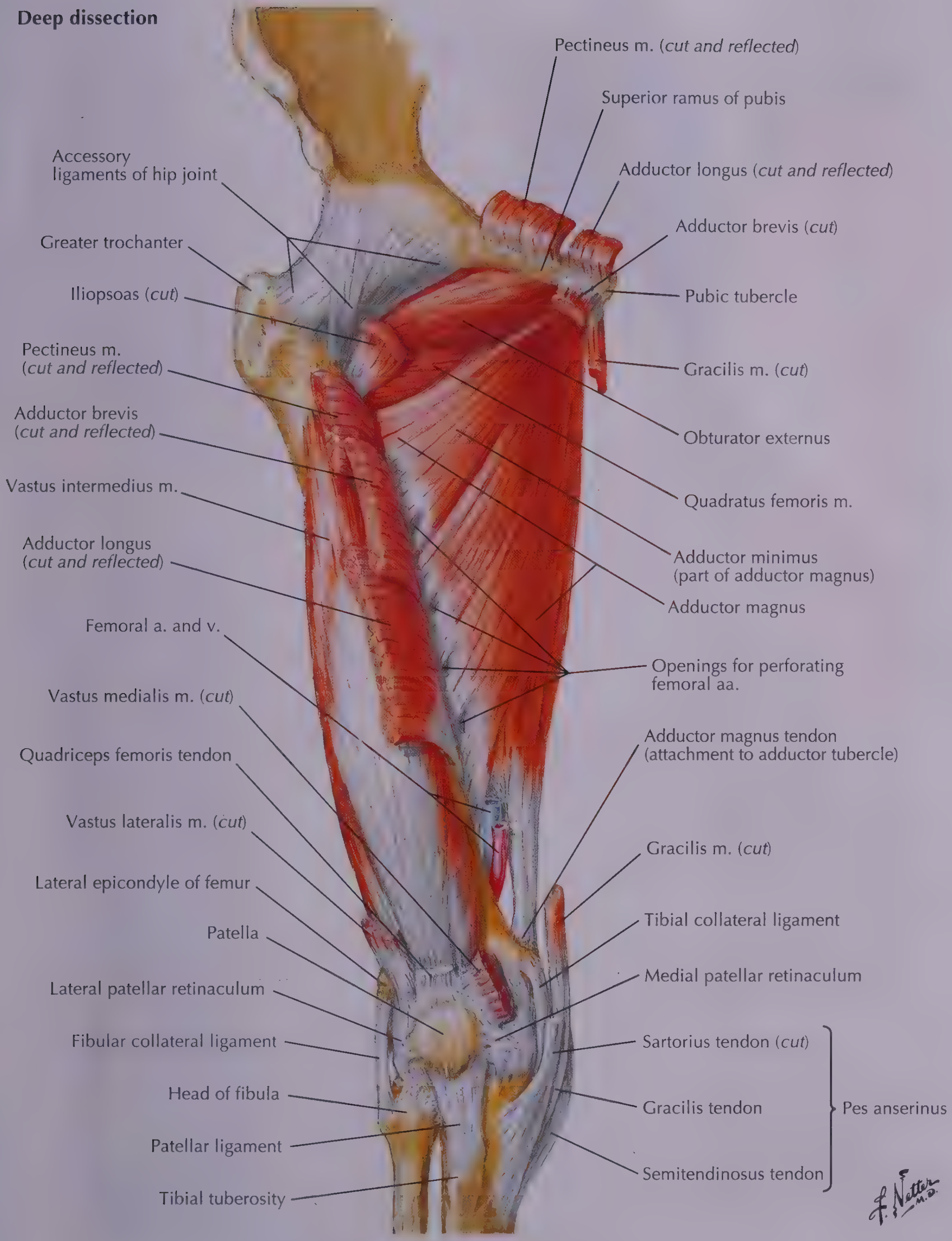

Iliac crest
External abdominal oblique m.
Gluteal aponeurosis
Anterior superior iliac spine
Sartorius m.
Gluteus maximus m.
Tensor fasciae latae
Rectus femoris m.
Vastus lateralis m.
Iliotibial tract
Biceps femoris m.
Long head
Short head
Lateral condyle of tibia
Semimembranosus m.
Lateral patellar retinaculum
Fibular collateral ligament
Patella
Plantaris m.
Extensor digitorum longus
Lateral head of gastrocnemius m.
Patellar ligament
Head of fibula
Fibularis longus m.
Tibialis anterior m.

Muscles of Thigh: Anterior Compartment

See also Plate 283


Anterior superior iliac spine
Iliacus m.
Psoas major
Gluteus medius m.
Inguinal ligament (Poupart's)
Pubic tubercle
Tensor fasciae latae
Pectineus m.
Adductor longus
Gracilis m.
Sartorius m.
Rectus femoris m.*
Vastus lateralis m.*
Vastus intermedius m.*
Vastus medialis m.*
Iliotibial tract
Rectus femoris tendon
Lateral patellar retinaculum
Patella
Medial patellar retinaculum
Patellar ligament
Sartorius tendon
Gracilis tendon
Semitendinosus tendon
Pes anserinus
Tibial tuberosity
Anterior superior iliac spine
Sartorius tendon of origin
Anterior inferior iliac spine
Accessory ligaments of hip joint
Pectineus m.
Tensor fasciae latae tendon
Rectus femoris tendons of origin
Greater trochanter
Iliopsoas (*cut*)
Vastoadductor membrane
Iliotibial tract (*cut*)
Rectus femoris tendon (*cut*)
Quadriceps femoris tendon
Patella
Lateral patellar retinaculum
Medial patellar retinaculum
Head of fibula
Patellar ligament
Tibial tuberosity
Sartorius tendon

*Quadriceps femoris muscle


Deep dissection
Pectineus m. (*cut and reflected*)
Superior ramus of pubis
Adductor longus (*cut and reflected*)
Adductor brevis (*cut*)
Pubic tubercle
Gracilis m. (*cut*)
Obturator externus
Quadratus femoris m.
Adductor minimus (part of adductor magnus)
Adductor magnus
Openings for perforating femoral aa.
Adductor magnus tendon (attachment to adductor tubercle)
Gracilis m. (*cut*)
Tibial collateral ligament
Medial patellar retinaculum
Sartorius tendon (*cut*)
Gracilis tendon
Semitendinosus tendon
Pes anserinus
Accessory ligaments of hip joint
Greater trochanter
Iliopsoas (*cut*)
Pectineus m. (*cut and reflected*)
Adductor brevis (*cut and reflected*)
Vastus intermedius m.
Adductor longus (*cut and reflected*)
Femoral a. and v.
Vastus medialis m. (*cut*)
Quadriceps femoris tendon
Vastus lateralis m. (*cut*)
Lateral epicondyle of femur
Patella
Lateral patellar retinaculum
Fibular collateral ligament
Head of fibula
Patellar ligament
Tibial tuberosity
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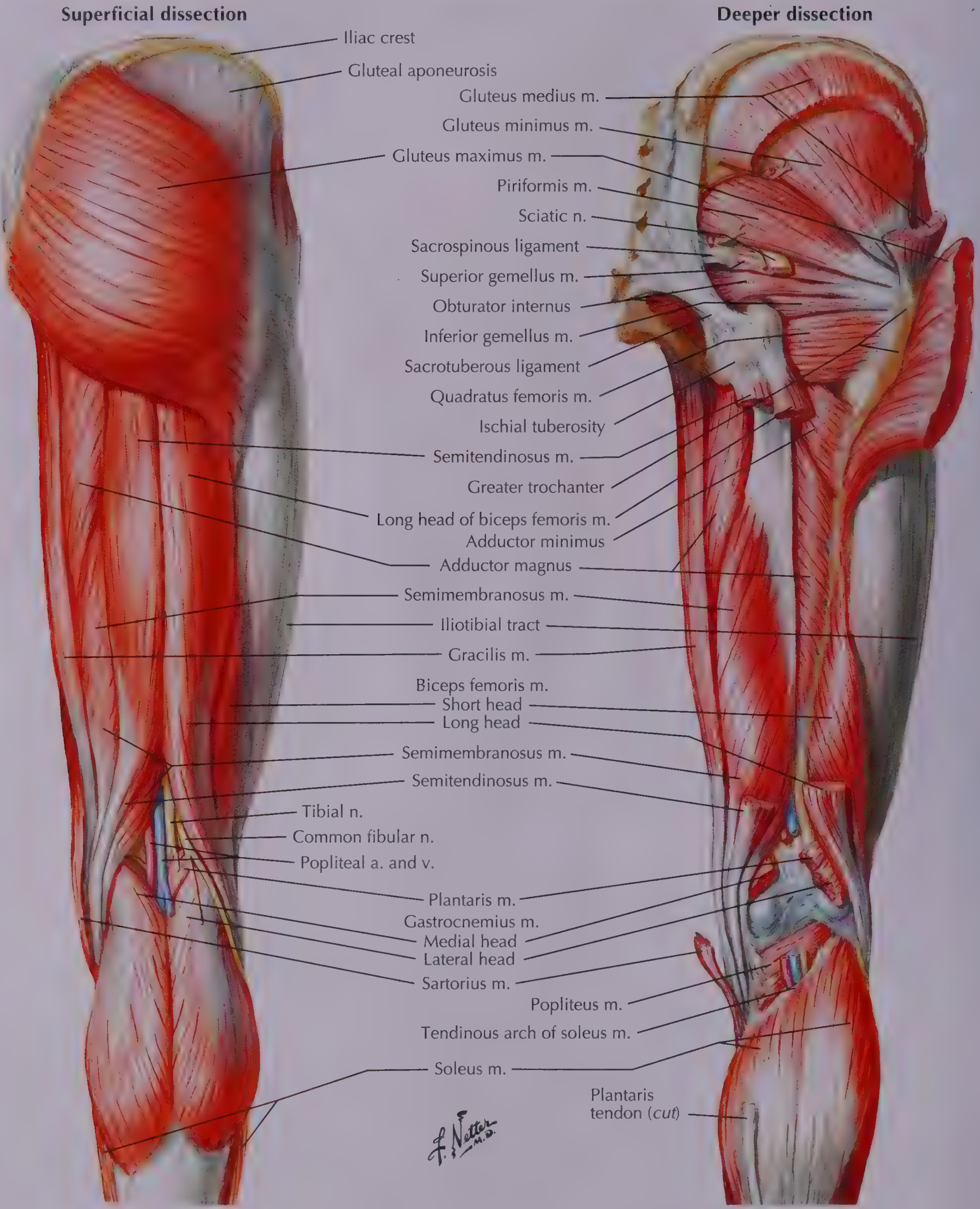
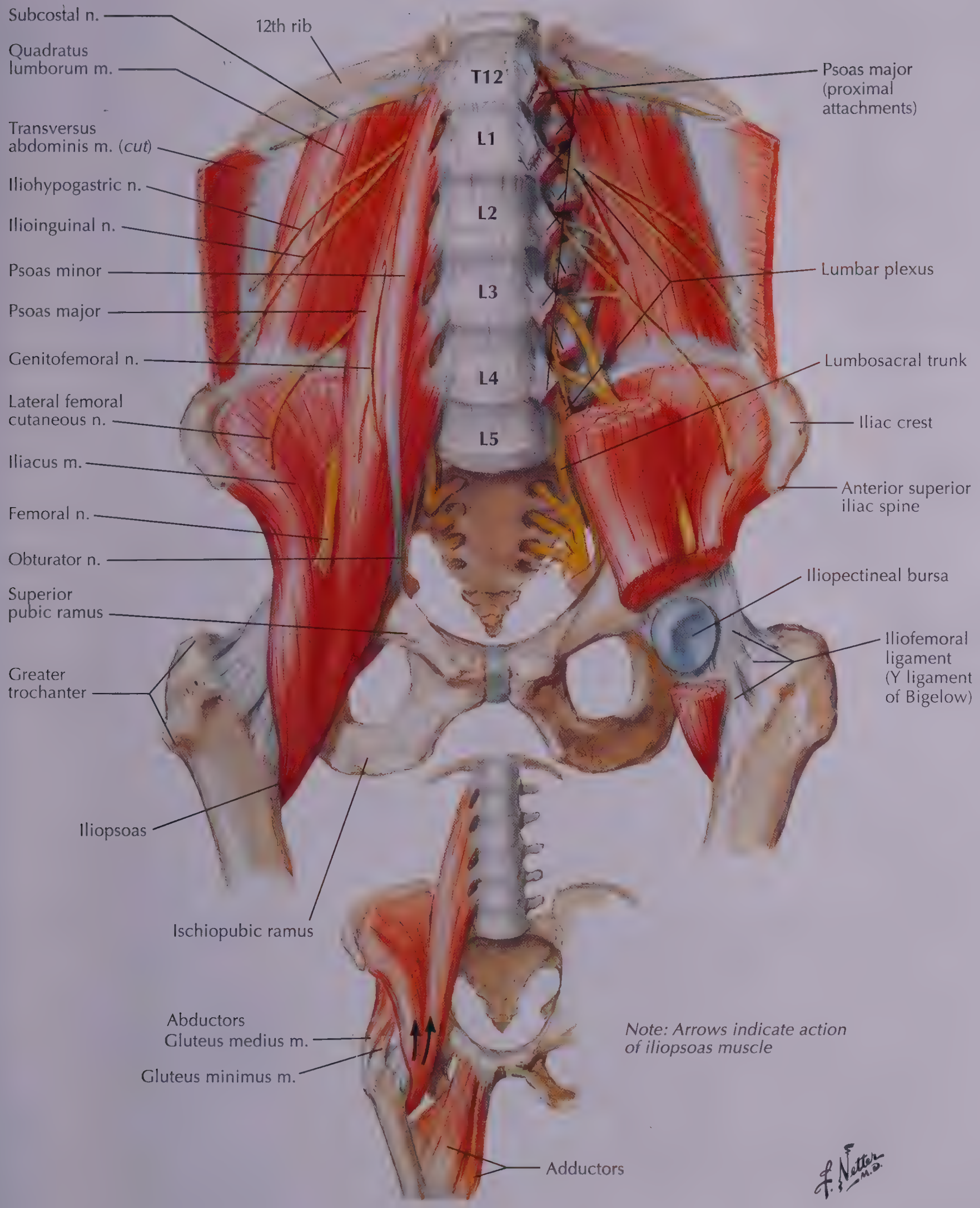
Muscles of Hip and Thigh: Posterior Views

See also Plates 361, 362, 510


Superficial dissection
Deeper dissection
Iliac crest
Gluteal aponeurosis
Gluteus medius m.
Gluteus minimus m.
Gluteus maximus m.
Piriformis m.
Sciatic n.
Sacrospinous ligament
Superior gemellus m.
Obturator internus
Inferior gemellus m.
Sacrotuberous ligament
Quadratus femoris m.
Ischial tuberosity
Semitendinosus m.
Greater trochanter
Long head of biceps femoris m.
Adductor minimus
Adductor magnus
Semimembranosus m.
Iliotibial tract
Gracilis m.
Biceps femoris m.
Short head
Long head
Semimembranosus m.
Semitendinosus m.
Tibial n.
Common fibular n.
Popliteal a. and v.
Plantaris m.
Gastrocnemius m.
Medial head
Lateral head
Sartorius m.
Popliteus m.
Tendinous arch of soleus m.
Soleus m.
Plantaris tendon (*cut*)
F. Netter M.D.

Psoas and Iliacus Muscle

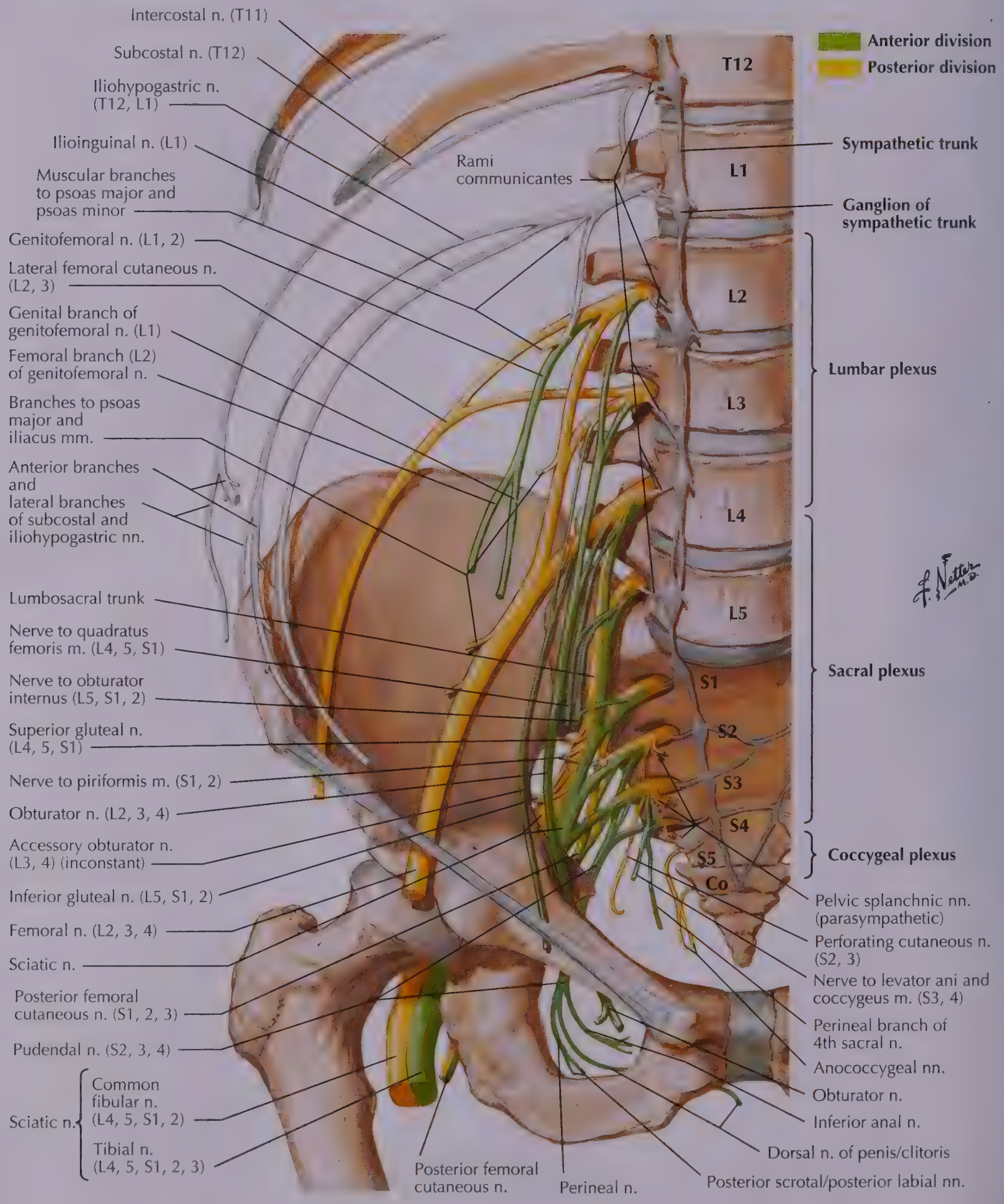
See also Plates 283, 287

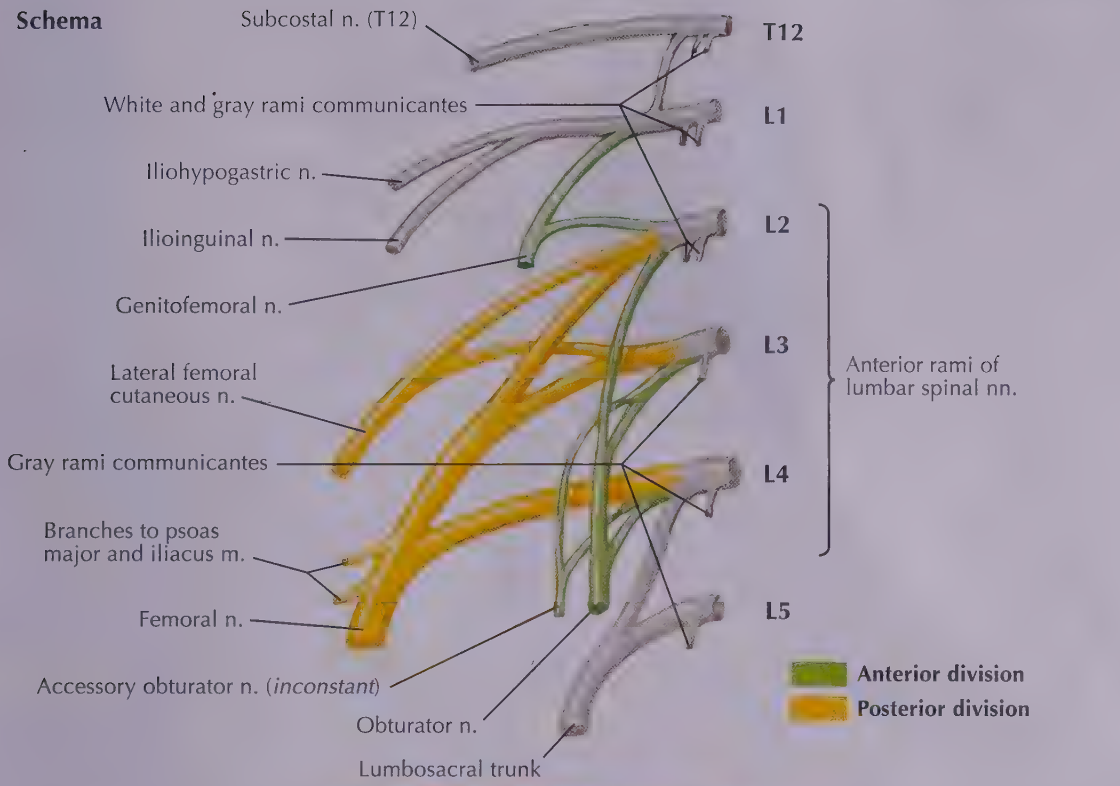

Subcostal n.
12th rib
Quadratus lumborum m.
Transversus abdominis m. (*cut*)
Iliohypogastric n.
Ilioinguinal n.
Psoas minor
Psoas major
Genitofemoral n.
Lateral femoral cutaneous n.
Iliacus m.
Femoral n.
Obturator n.
Superior pubic ramus
Greater trochanter
Iliopsoas
Ischiopubic ramus
T12
L1
L2
L3
L4
L5
Psoas major (proximal attachments)
Lumbar plexus
Lumbosacral trunk
Iliac crest
Anterior superior iliac spine
Iliopectineal bursa
Iliofemoral ligament (Y ligament of Bigelow)
Abductors
Gluteus medius m.
Gluteus minimus m.
Adductors
F. Netter M.D.

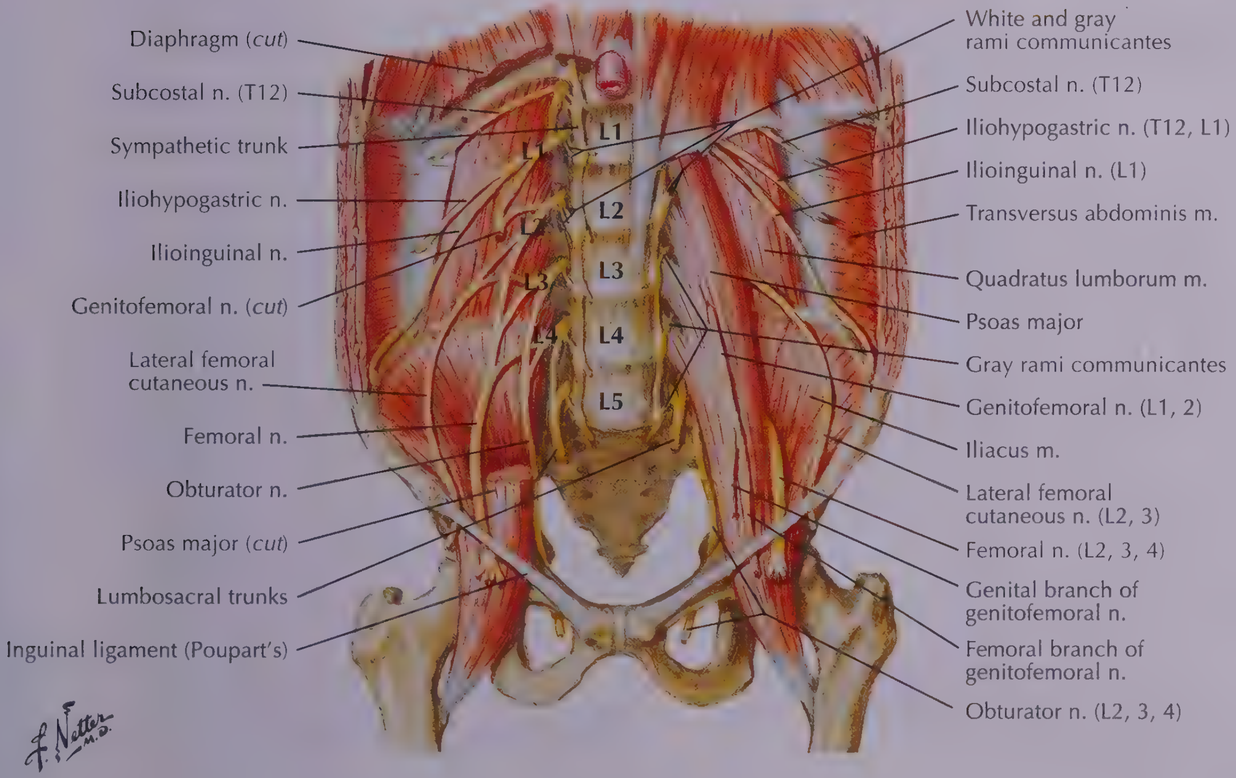
Note: Arrows indicate action of iliopsoas muscle

Lumbosacral Plexuses

See also Plate 287

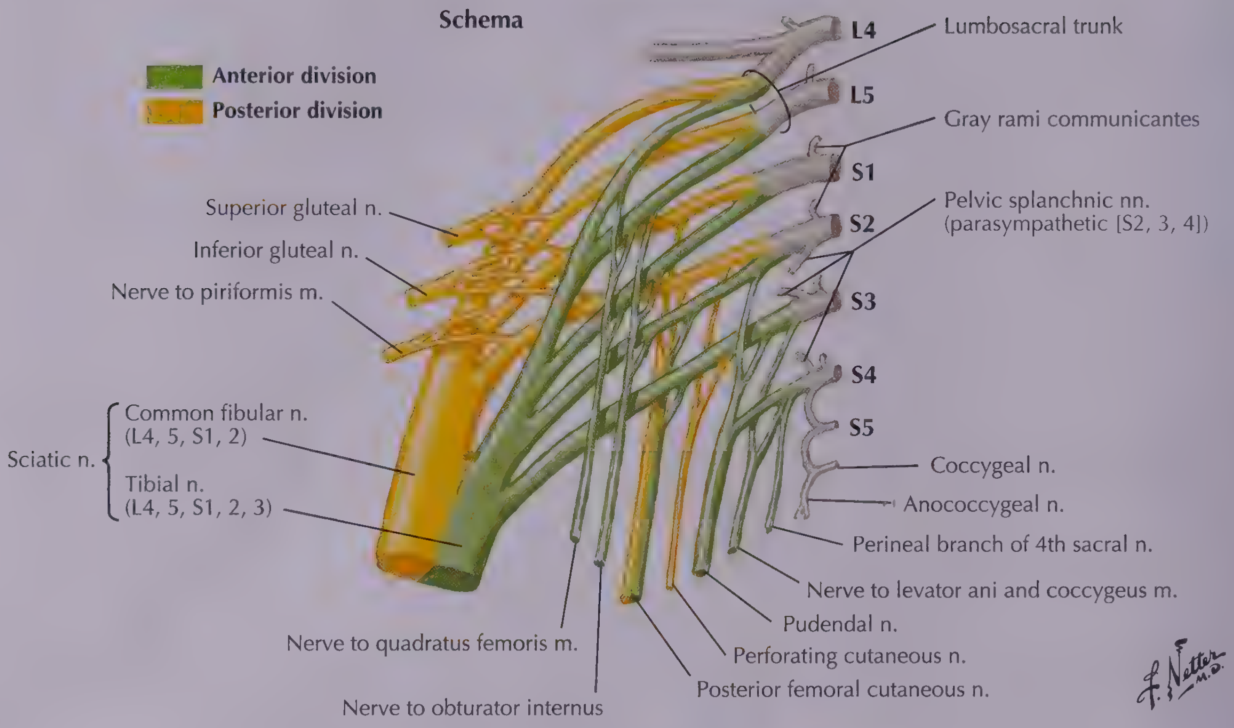

Intercostal n. (T11)
Subcostal n. (T12)
Iliohypogastric n. (T12, L1)
Ilioinguinal n. (L1)
Muscular branches to psoas major and psoas minor
Genitofemoral n. (L1, 2)
Lateral femoral cutaneous n. (L2, 3)
Genital branch of genitofemoral n. (L1)
Femoral branch (L2) of genitofemoral n.
Branches to psoas major and iliacus mm.
Anterior branches and lateral branches of subcostal and iliohypogastric nn.
Lumbosacral trunk
Nerve to quadratus femoris m. (L4, 5, S1)
Nerve to obturator internus (L5, S1, 2)
Superior gluteal n. (L4, 5, S1)
Nerve to piriformis m. (S1, 2)
Obturator n. (L2, 3, 4)
Accessory obturator n. (L3, 4) (inconstant)
Inferior gluteal n. (L5, S1, 2)
Femoral n. (L2, 3, 4)
Sciatic n.
Posterior femoral cutaneous n. (S1, 2, 3)
Pudendal n. (S2, 3, 4)
Sciatic n.
Common fibular n. (L4, 5, S1, 2)
Tibial n. (L4, 5, S1, 2, 3)
Posterior femoral cutaneous n.
Perineal n.
Rami communicantes
T12
L1
L2
L3
L4
L5
S1
S2
S3
S4
S5
Co
🟩 Anterior division
🟨 Posterior division
Sympathetic trunk
Ganglion of sympathetic trunk
Lumbar plexus
Sacral plexus
Coccygeal plexus
Pelvic splanchnic nn. (parasympathetic)
Perforating cutaneous n. (S2, 3)
Nerve to levator ani and coccygeus m. (S3, 4)
Perineal branch of 4th sacral n.
Anococcygeal nn.
Obturator n.
Inferior anal n.
Dorsal n. of penis/clitoris
Posterior scrotal/posterior labial nn.
F. Netter M.D.

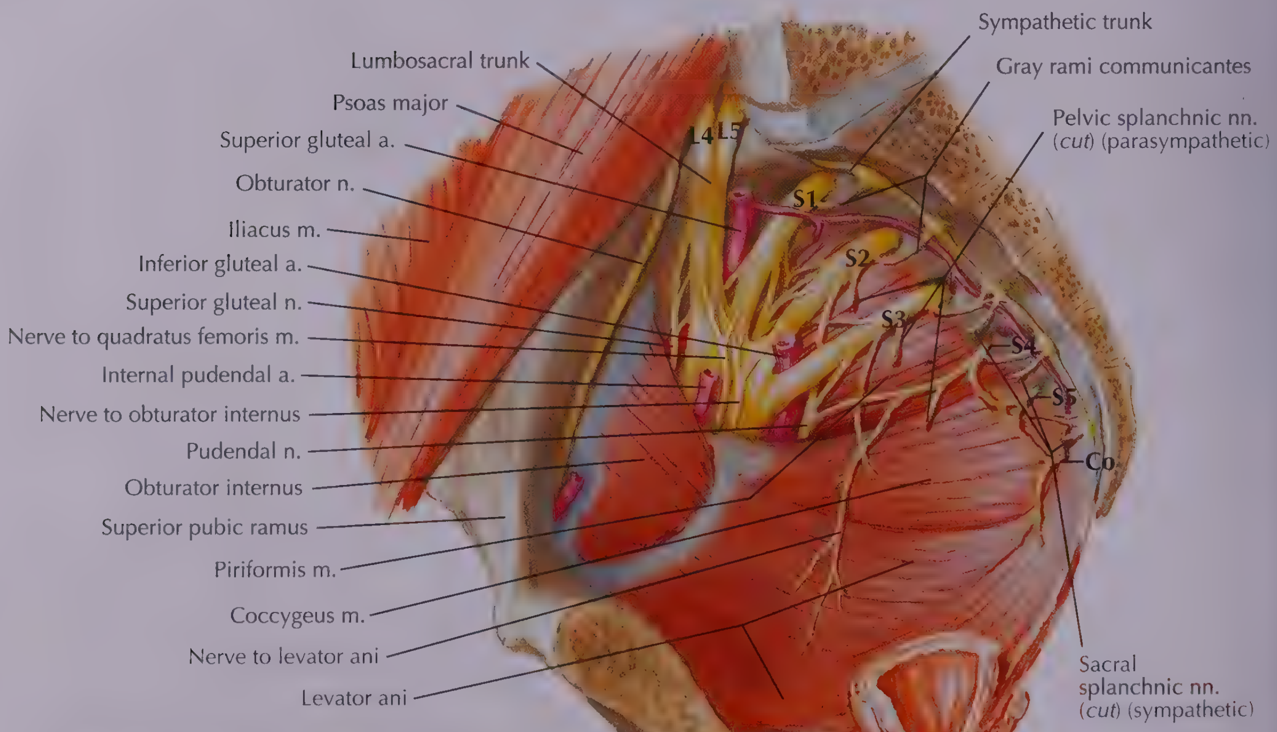

Schema
Subcostal n. (T12)
T12
White and gray rami communicantes
L1
Iliohypogastric n.
Ilioinguinal n.
L2
Genitofemoral n.
L3
Lateral femoral cutaneous n.
Anterior rami of lumbar spinal nn.
Gray rami communicantes
L4
Branches to psoas major and iliacus m.
Femoral n.
L5
Accessory obturator n. (*inconstant*)
Obturator n.
Lumbosacral trunk
🟩 Anterior division
🟧 Posterior division


Diaphragm (*cut*)
Subcostal n. (T12)
Sympathetic trunk
Iliohypogastric n.
Ilioinguinal n.
Genitofemoral n. (*cut*)
Lateral femoral cutaneous n.
Femoral n.
Obturator n.
Psoas major (*cut*)
Lumbosacral trunks
Inguinal ligament (Poupart's)
L1
L2
L3
L4
L5
L1
L2
L3
L4
White and gray rami communicantes
Subcostal n. (T12)
Iliohypogastric n. (T12, L1)
Ilioinguinal n. (L1)
Transversus abdominis m.
Quadratus lumborum m.
Psoas major
Gray rami communicantes
Genitofemoral n. (L1, 2)
Iliacus m.
Lateral femoral cutaneous n. (L2, 3)
Femoral n. (L2, 3, 4)
Genital branch of genitofemoral n.
Femoral branch of genitofemoral n.
Obturator n. (L2, 3, 4)
F. Netter M.D.

Sacral and Coccygeal Plexuses

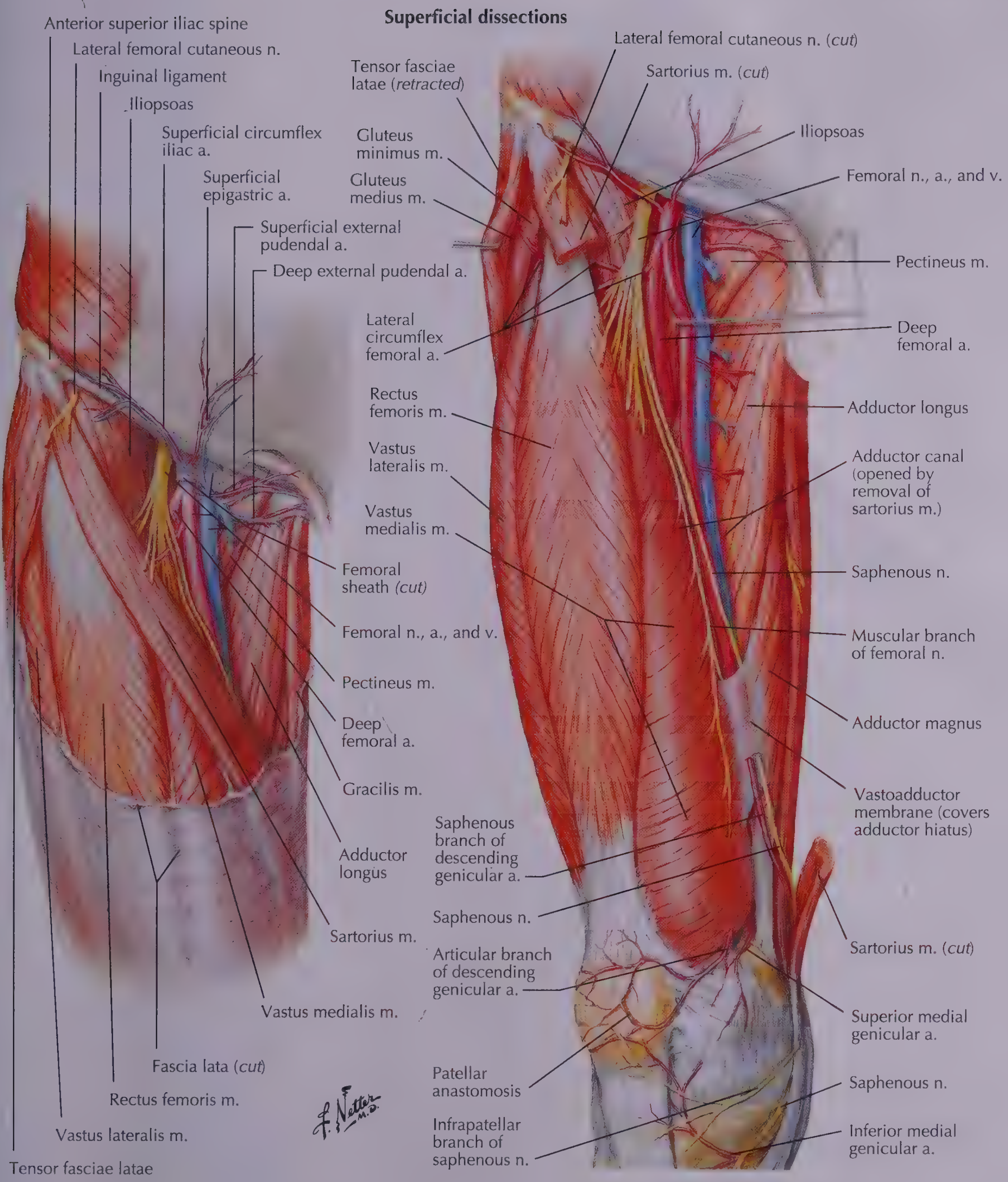
See also Plate 287


Schema
🟩 Anterior division
🟨 Posterior division
L4
Lumbosacral trunk
L5
Gray rami communicantes
S1
S2
Pelvic splanchnic nn.
(parasympathetic [S2, 3, 4])
Superior gluteal n.
Inferior gluteal n.
Nerve to piriformis m.
S3
S4
S5
Sciatic n.
Common fibular n.
(L4, 5, S1, 2)
Tibial n.
(L4, 5, S1, 2, 3)
Coccygeal n.
Anococcygeal n.
Perineal branch of 4th sacral n.
Nerve to levator ani and coccygeus m.
Pudendal n.
Nerve to quadratus femoris m.
Perforating cutaneous n.
Posterior femoral cutaneous n.
Nerve to obturator internus
F. Netter M.D.


Sympathetic trunk
Lumbosacral trunk
Gray rami communicantes
Psoas major
Pelvic splanchnic nn.
(cut) (parasympathetic)
L4
L5
Superior gluteal a.
Obturator n.
S1
Iliacus m.
S2
Inferior gluteal a.
Superior gluteal n.
S3
Nerve to quadratus femoris m.
S4
Internal pudendal a.
S5
Nerve to obturator internus
Pudendal n.
Co
Obturator internus
Superior pubic ramus
Piriformis m.
Coccygeus m.
Nerve to levator ani
Sacral
splanchnic nn.
(cut) (sympathetic)
Levator ani

Topography: medial and slightly anterior view of hemisected pelvis

See also Plates 522, 550, BP 103



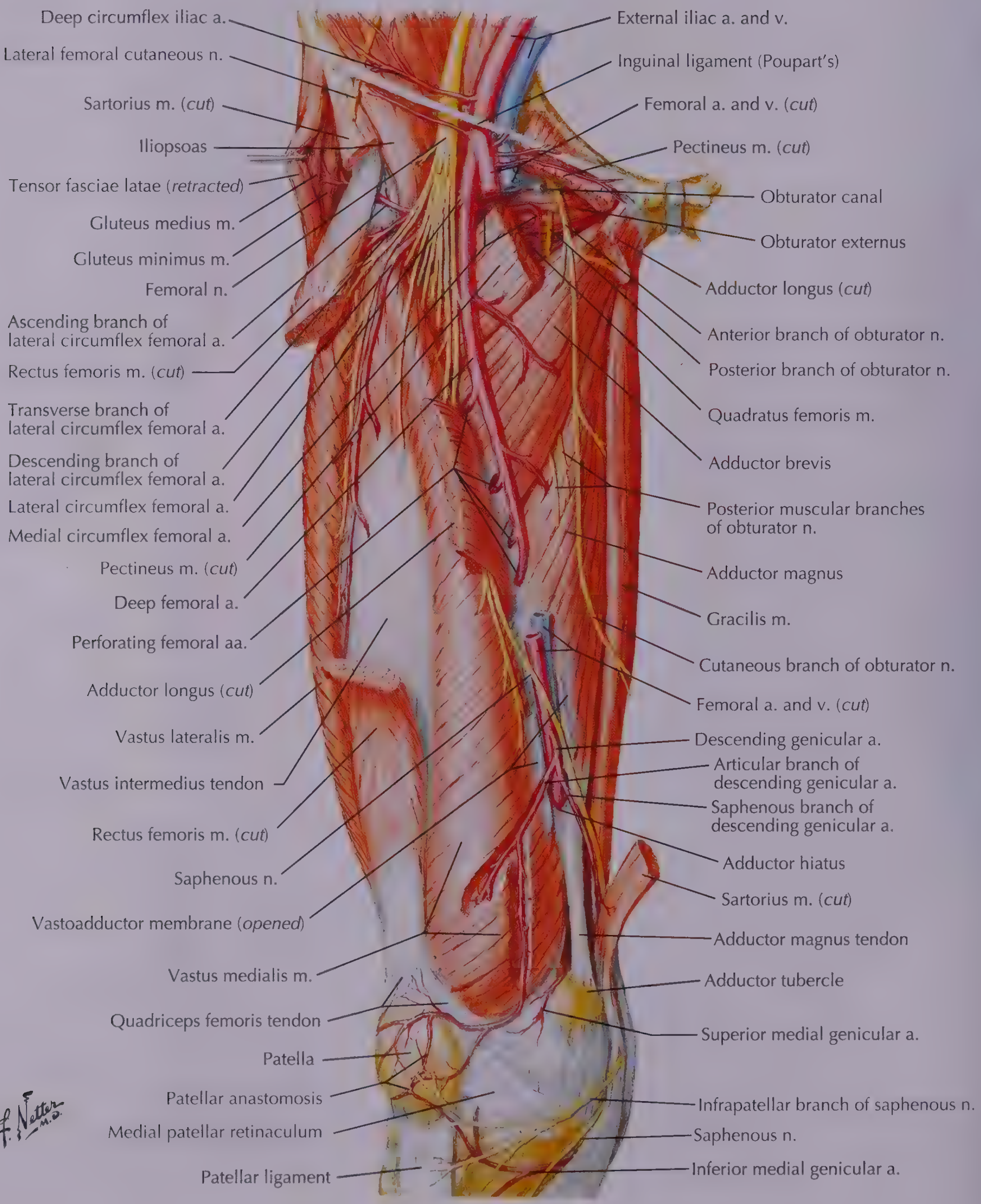
Superficial dissections

Anterior superior iliac spine
Lateral femoral cutaneous n.
Inguinal ligament
Iliopsoas
Superficial circumflex iliac a.
Superficial epigastric a.
Superficial external pudendal a.
Deep external pudendal a.
Femoral sheath (*cut*)
Femoral n., a., and v.
Pectineus m.
Deep femoral a.
Gracilis m.
Adductor longus
Sartorius m.
Vastus medialis m.
Fascia lata (*cut*)
Rectus femoris m.
Vastus lateralis m.
Tensor fasciae latae
Tensor fasciae latae (*retracted*)
Gluteus minimus m.
Gluteus medius m.
Lateral circumflex femoral a.
Rectus femoris m.
Vastus lateralis m.
Vastus medialis m.
Saphenous branch of descending genicular a.
Saphenous n.
Articular branch of descending genicular a.
Patellar anastomosis
Infrapatellar branch of saphenous n.
Lateral femoral cutaneous n. (*cut*)
Sartorius m. (*cut*)
Iliopsoas
Femoral n., a., and v.
Pectineus m.
Deep femoral a.
Adductor longus
Adductor canal (opened by removal of sartorius m.)
Saphenous n.
Muscular branch of femoral n.
Adductor magnus
Vastoadductor membrane (covers adductor hiatus)
Sartorius m. (*cut*)
Superior medial genicular a.
Saphenous n.
Inferior medial genicular a.

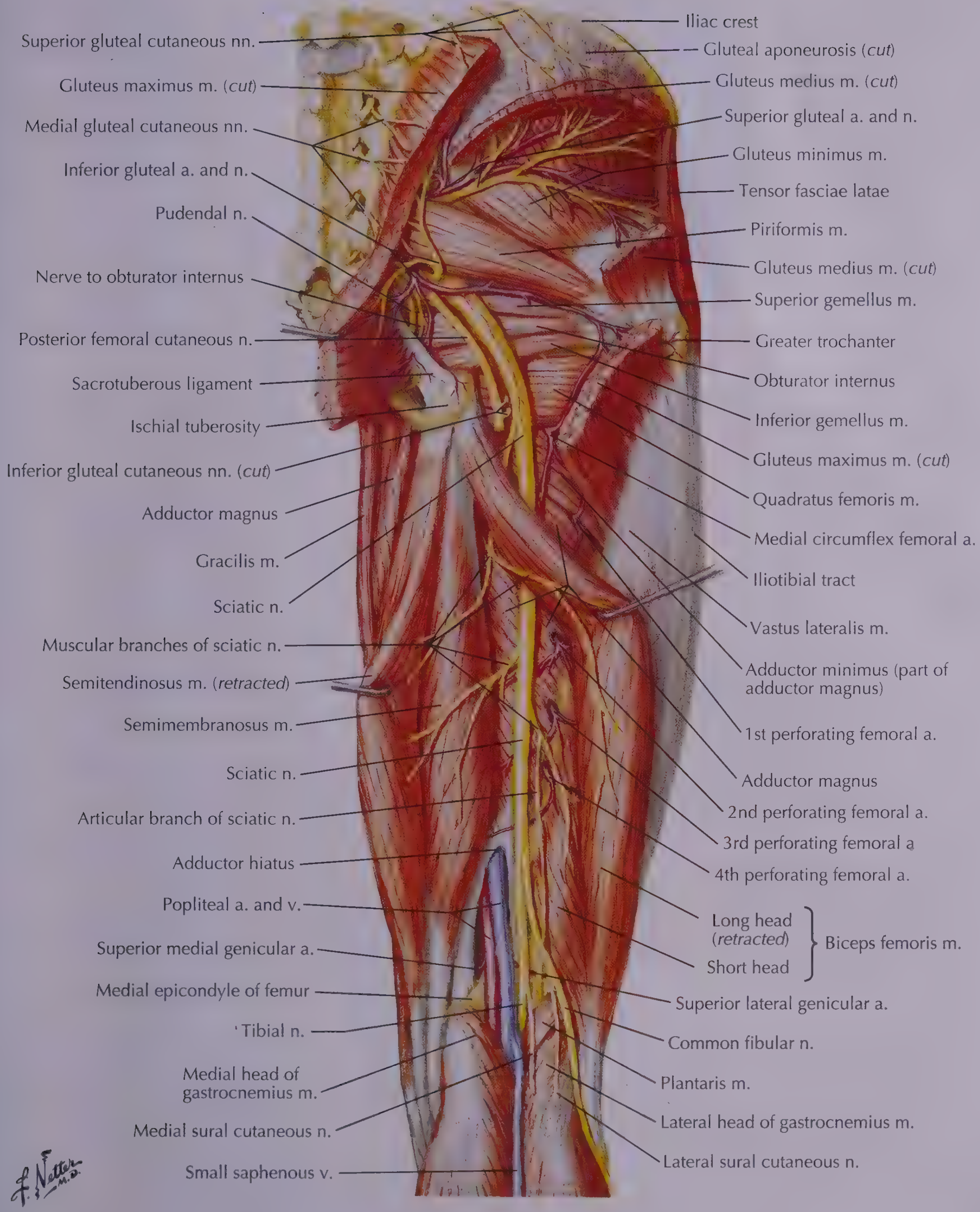
Arteries of Thigh: Anterior View of Deeper Dissection

See also Plates 550, 551, BP 103

Deep dissection

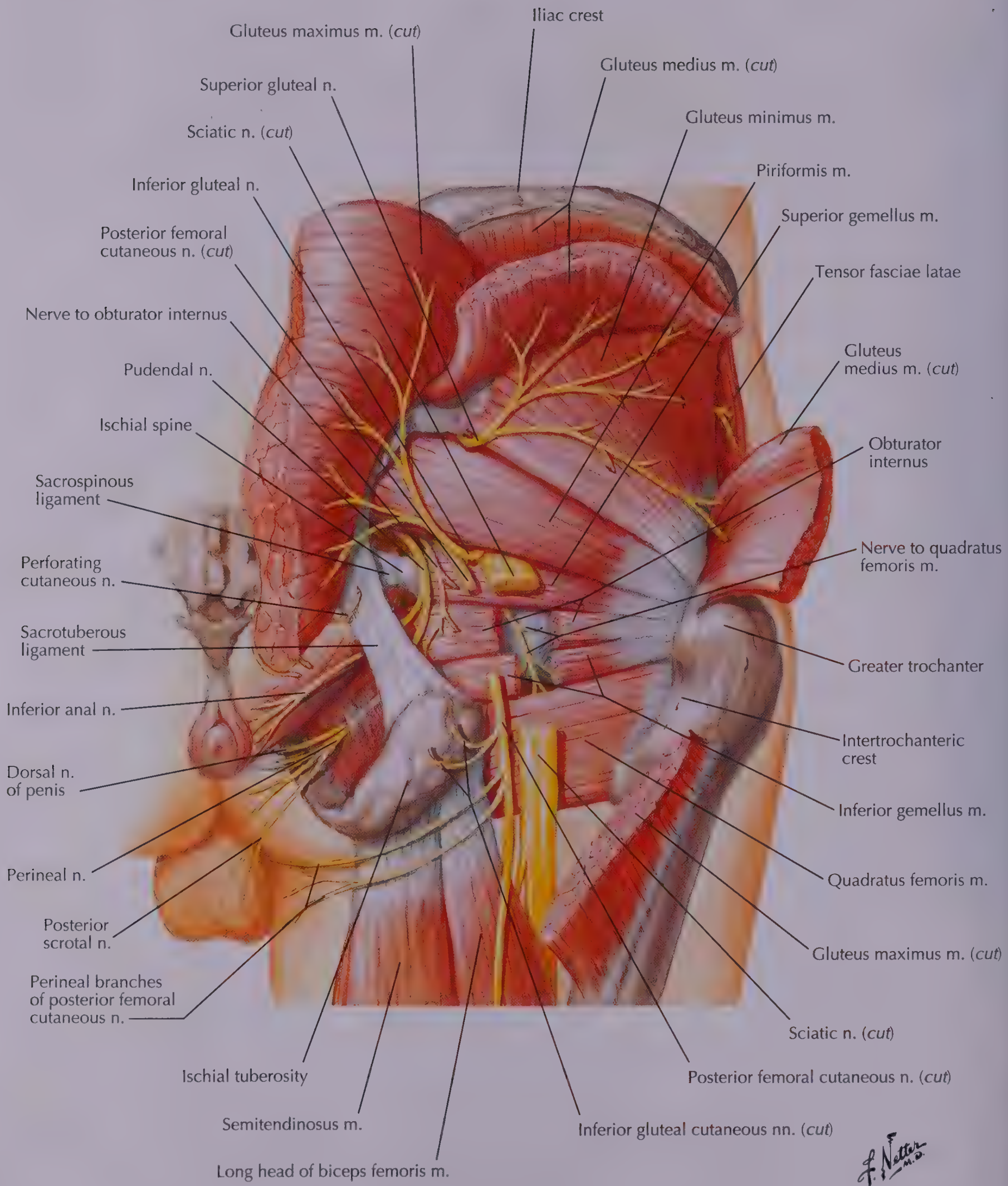

Deep circumflex iliac a.
Lateral femoral cutaneous n.
Sartorius m. (*cut*)
Iliopsoas
Tensor fasciae latae (*retracted*)
Gluteus medius m.
Gluteus minimus m.
Femoral n.
Ascending branch of lateral circumflex femoral a.
Rectus femoris m. (*cut*)
Transverse branch of lateral circumflex femoral a.
Descending branch of lateral circumflex femoral a.
Lateral circumflex femoral a.
Medial circumflex femoral a.
Pectineus m. (*cut*)
Deep femoral a.
Perforating femoral aa.
Adductor longus (*cut*)
Vastus lateralis m.
Vastus intermedius tendon
Rectus femoris m. (*cut*)
Saphenous n.
Vastoadductor membrane (*opened*)
Vastus medialis m.
Quadriceps femoris tendon
Patella
Patellar anastomosis
Medial patellar retinaculum
Patellar ligament
External iliac a. and v.
Inguinal ligament (Poupart's)
Femoral a. and v. (*cut*)
Pectineus m. (*cut*)
Obturator canal
Obturator externus
Adductor longus (*cut*)
Anterior branch of obturator n.
Posterior branch of obturator n.
Quadratus femoris m.
Adductor brevis
Posterior muscular branches of obturator n.
Adductor magnus
Gracilis m.
Cutaneous branch of obturator n.
Femoral a. and v. (*cut*)
Descending genicular a.
Articular branch of descending genicular a.
Saphenous branch of descending genicular a.
Adductor hiatus
Sartorius m. (*cut*)
Adductor magnus tendon
Adductor tubercle
Superior medial genicular a.
Infrapatellar branch of saphenous n.
Saphenous n.
Inferior medial genicular a.
F. Netter M.D.

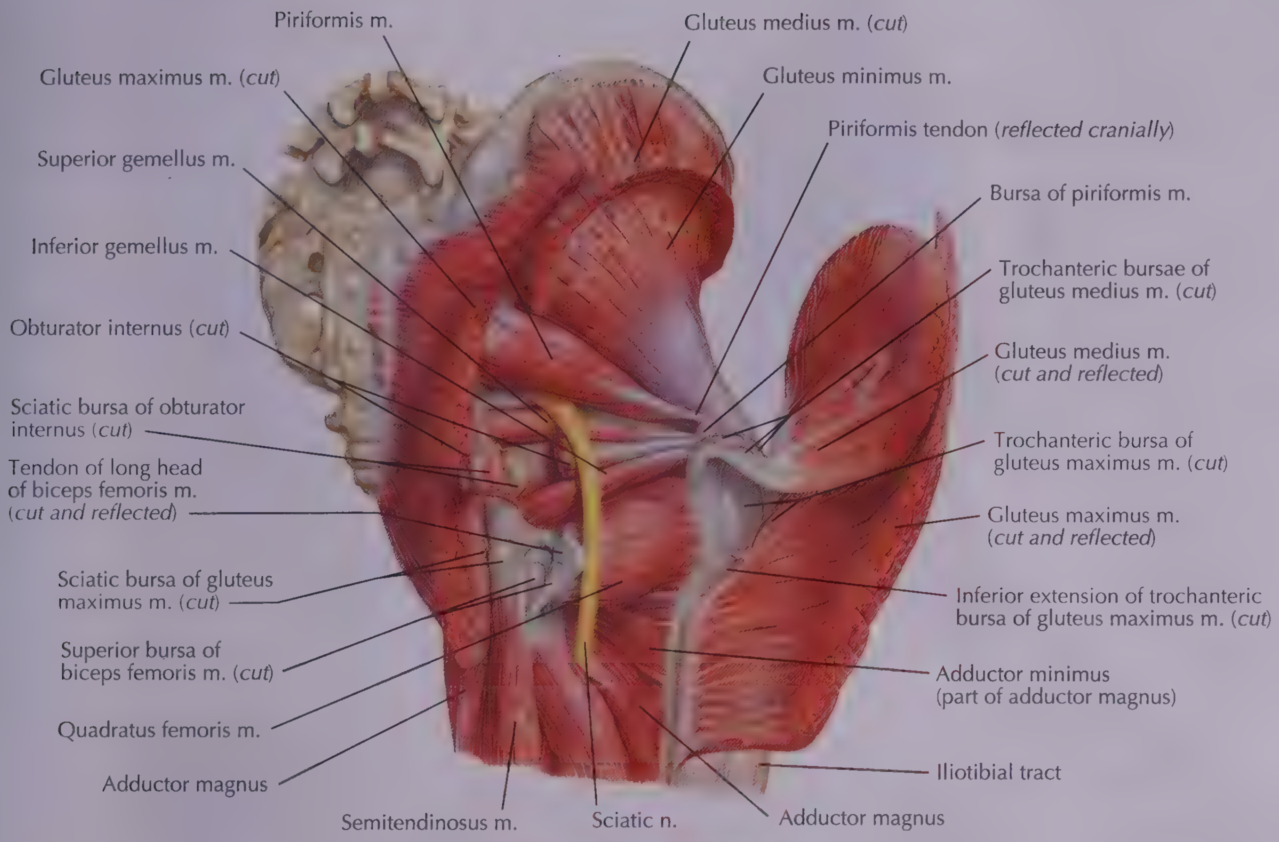
See also Plates 552, BP 103

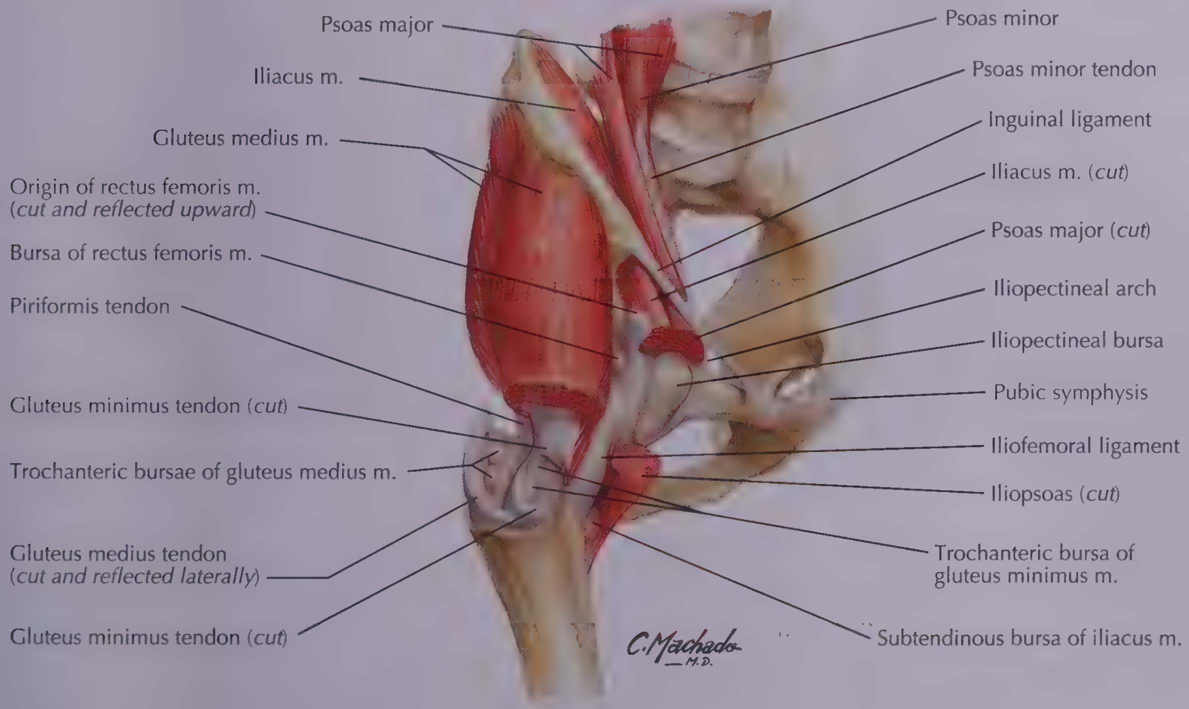

Deep dissection
Superior gluteal cutaneous nn.
Gluteus maximus m. (*cut*)
Medial gluteal cutaneous nn.
Inferior gluteal a. and n.
Pudendal n.
Nerve to obturator internus
Posterior femoral cutaneous n.
Sacrotuberous ligament
Ischial tuberosity
Inferior gluteal cutaneous nn. (*cut*)
Adductor magnus
Gracilis m.
Sciatic n.
Muscular branches of sciatic n.
Semitendinosus m. (*retracted*)
Semimembranosus m.
Sciatic n.
Articular branch of sciatic n.
Adductor hiatus
Popliteal a. and v.
Superior medial genicular a.
Medial epicondyle of femur
Tibial n.
Medial head of gastrocnemius m.
Medial sural cutaneous n.
Small saphenous v.
Iliac crest
Gluteal aponeurosis (*cut*)
Gluteus medius m. (*cut*)
Superior gluteal a. and n.
Gluteus minimus m.
Tensor fasciae latae
Piriformis m.
Gluteus medius m. (*cut*)
Superior gemellus m.
Greater trochanter
Obturator internus
Inferior gemellus m.
Gluteus maximus m. (*cut*)
Quadratus femoris m.
Medial circumflex femoral a.
Iliotibial tract
Vastus lateralis m.
Adductor minimus (part of adductor magnus)
1st perforating femoral a.
Adductor magnus
2nd perforating femoral a.
3rd perforating femoral a
4th perforating femoral a.
Long head (*retracted*)
Short head
Biceps femoris m.
Superior lateral genicular a.
Common fibular n.
Plantaris m.
Lateral head of gastrocnemius m.
Lateral sural cutaneous n.
F. Netter M.D.

Nerves of Buttock

See also Plates 356, 413

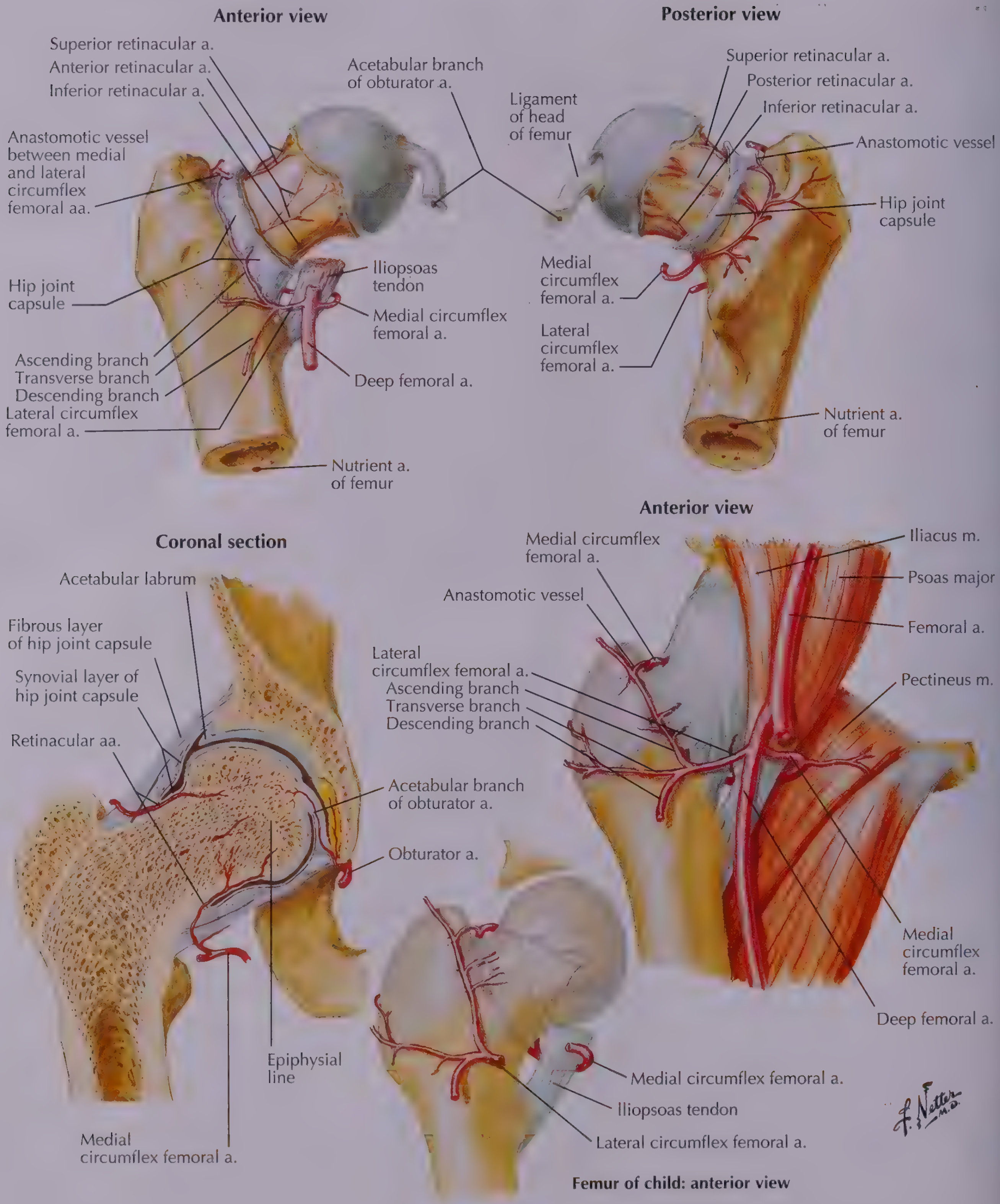

Gluteus maximus m. (*cut*)
Iliac crest
Gluteus medius m. (*cut*)
Superior gluteal n.
Gluteus minimus m.
Sciatic n. (*cut*)
Piriformis m.
Inferior gluteal n.
Superior gemellus m.
Posterior femoral cutaneous n. (*cut*)
Tensor fasciae latae
Nerve to obturator internus
Gluteus medius m. (*cut*)
Pudendal n.
Ischial spine
Obturator internus
Sacrospinous ligament
Perforating cutaneous n.
Nerve to quadratus femoris m.
Sacrotuberous ligament
Greater trochanter
Inferior anal n.
Intertrochanteric crest
Dorsal n. of penis
Inferior gemellus m.
Perineal n.
Quadratus femoris m.
Posterior scrotal n.
Gluteus maximus m. (*cut*)
Perineal branches of posterior femoral cutaneous n.
Sciatic n. (*cut*)
Ischial tuberosity
Posterior femoral cutaneous n. (*cut*)
Semitendinosus m.
Inferior gluteal cutaneous nn. (*cut*)
Long head of biceps femoris m.
F. Netter M.D.


Piriformis m.
Gluteus maximus m. (*cut*)
Superior gemellus m.
Inferior gemellus m.
Obturator internus (*cut*)
Sciatic bursa of obturator internus (*cut*)
Tendon of long head of biceps femoris m. (*cut and reflected*)
Sciatic bursa of gluteus maximus m. (*cut*)
Superior bursa of biceps femoris m. (*cut*)
Quadratus femoris m.
Adductor magnus
Semitendinosus m.
Sciatic n.
Gluteus medius m. (*cut*)
Gluteus minimus m.
Piriformis tendon (*reflected cranially*)
Bursa of piriformis m.
Trochanteric bursae of gluteus medius m. (*cut*)
Gluteus medius m. (*cut and reflected*)
Trochanteric bursa of gluteus maximus m. (*cut*)
Gluteus maximus m. (*cut and reflected*)
Inferior extension of trochanteric bursa of gluteus maximus m. (*cut*)
Adductor minimus (part of adductor magnus)
Iliotibial tract
Adductor magnus


Psoas major
Iliacus m.
Gluteus medius m.
Origin of rectus femoris m. (*cut and reflected upward*)
Bursa of rectus femoris m.
Piriformis tendon
Gluteus minimus tendon (*cut*)
Trochanteric bursae of gluteus medius m.
Gluteus medius tendon (*cut and reflected laterally*)
Gluteus minimus tendon (*cut*)
Psoas minor
Psoas minor tendon
Inguinal ligament
Iliacus m. (*cut*)
Psoas major (*cut*)
Iliopectineal arch
Iliopectineal bursa
Pubic symphysis
Iliofemoral ligament
Iliopsoas (*cut*)
Trochanteric bursa of gluteus minimus m.
Subtendinous bursa of iliacus m.
C. Machado M.D.

Arteries of Femoral Head and Neck

See also Plates 496, 522



Anterior view

Superior retinacular a.
Anterior retinacular a.
Inferior retinacular a.
Acetabular branch of obturator a.
Anastomotic vessel between medial and lateral circumflex femoral aa.
Hip joint capsule
Iliopsoas tendon
Medial circumflex femoral a.
Ascending branch
Transverse branch
Descending branch
Lateral circumflex femoral a.
Deep femoral a.
Nutrient a. of femur

Posterior view

Ligament of head of femur
Superior retinacular a.
Posterior retinacular a.
Inferior retinacular a.
Anastomotic vessel
Hip joint capsule
Medial circumflex femoral a.
Lateral circumflex femoral a.
Nutrient a. of femur

Coronal section

Acetabular labrum
Fibrous layer of hip joint capsule
Synovial layer of hip joint capsule
Retinacular aa.
Acetabular branch of obturator a.
Obturator a.
Epiphysial line
Medial circumflex femoral a.

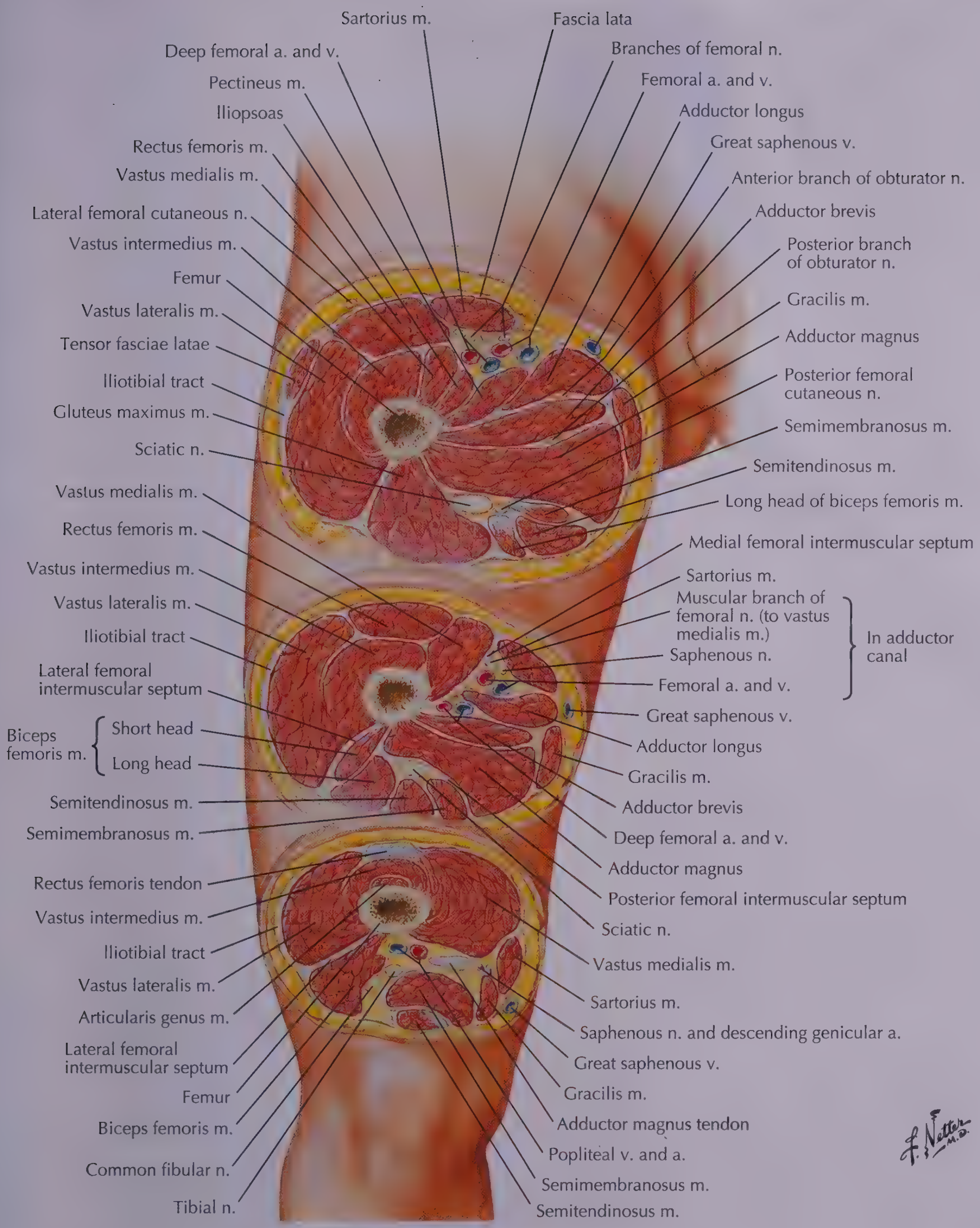
Anterior view

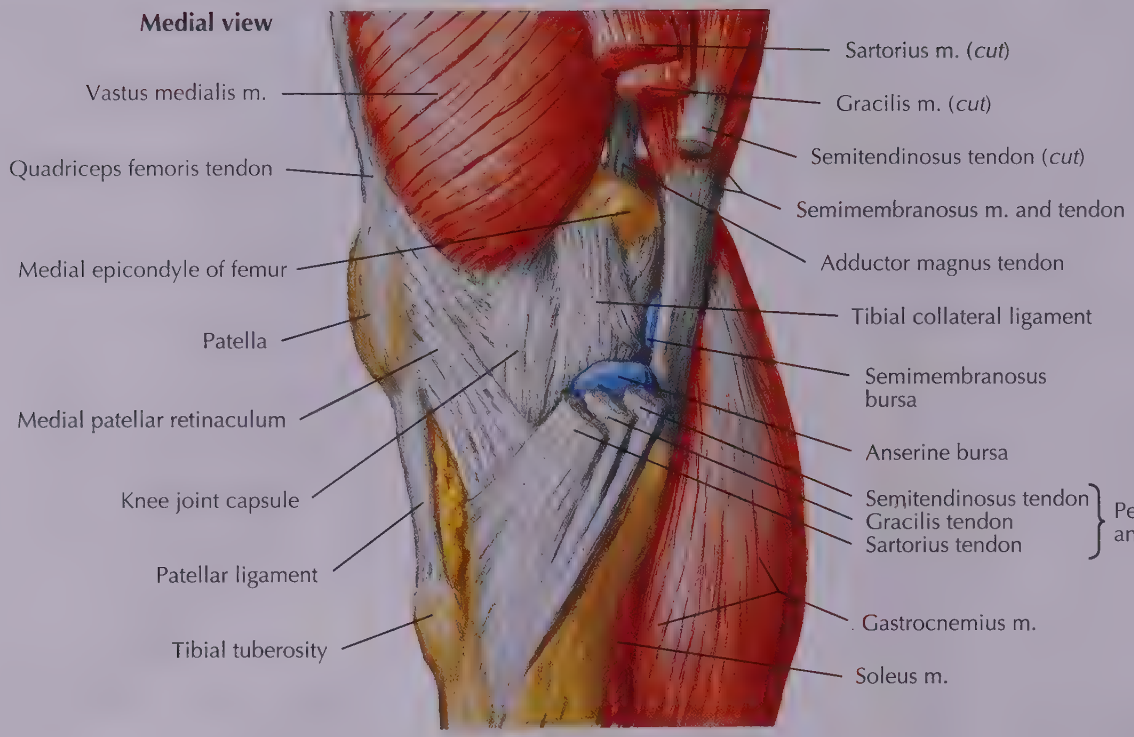
Medial circumflex femoral a.
Iliacus m.
Psoas major
Anastomotic vessel
Femoral a.
Lateral circumflex femoral a.
Ascending branch
Transverse branch
Descending branch
Pectineus m.
Medial circumflex femoral a.
Deep femoral a.

Medial circumflex femoral a.
Iliopsoas tendon
Lateral circumflex femoral a.
F. Netter M.D.

Femur of child: anterior view

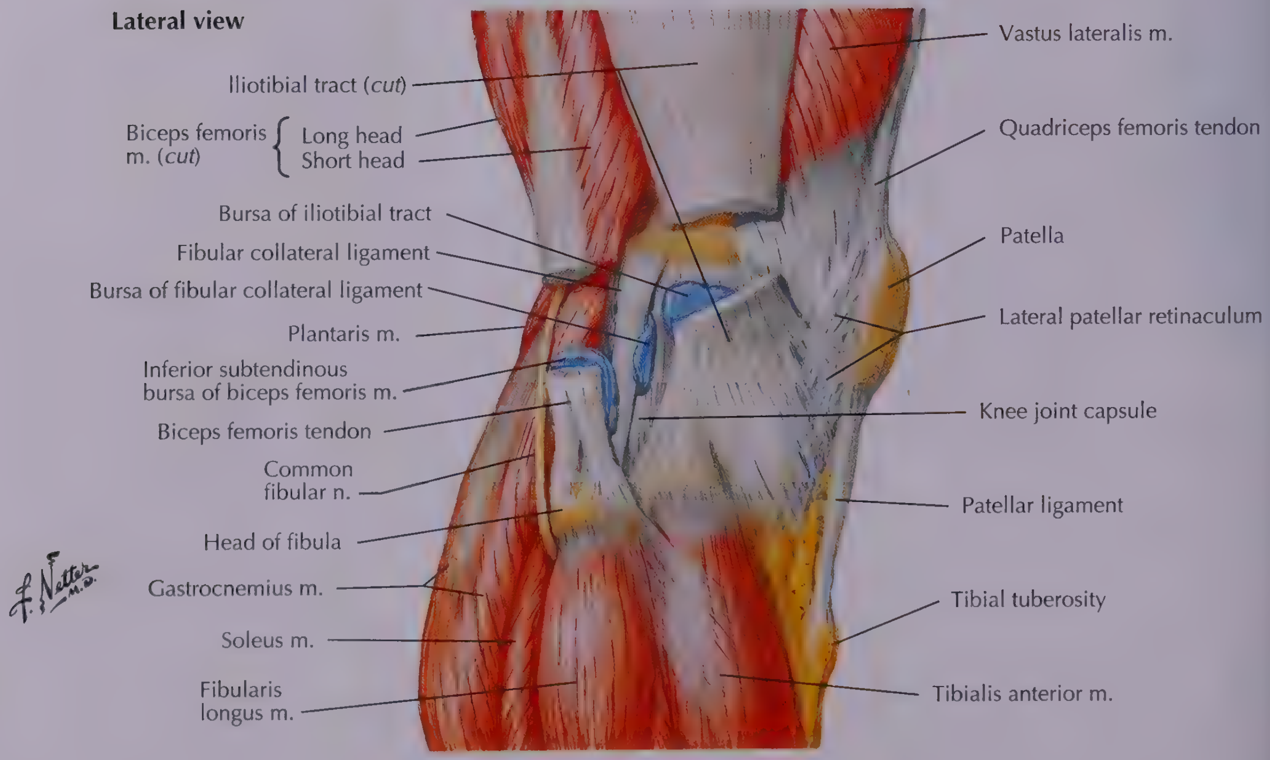
Thigh: Serial Cross Sections


Sartorius m.
Fascia lata
Deep femoral a. and v.
Branches of femoral n.
Pectineus m.
Femoral a. and v.
Iliopsoas
Adductor longus
Rectus femoris m.
Great saphenous v.
Vastus medialis m.
Anterior branch of obturator n.
Lateral femoral cutaneous n.
Adductor brevis
Vastus intermedius m.
Posterior branch of obturator n.
Femur
Gracilis m.
Vastus lateralis m.
Adductor magnus
Tensor fasciae latae
Posterior femoral cutaneous n.
Iliotibial tract
Gluteus maximus m.
Semimembranosus m.
Sciatic n.
Semitendinosus m.
Vastus medialis m.
Long head of biceps femoris m.
Rectus femoris m.
Medial femoral intermuscular septum
Vastus intermedius m.
Sartorius m.
Vastus lateralis m.
Muscular branch of femoral n. (to vastus medialis m.)
Iliotibial tract
Saphenous n.
Lateral femoral intermuscular septum
Femoral a. and v.
In adductor canal
Great saphenous v.
Biceps femoris m.
Short head
Long head
Adductor longus
Gracilis m.
Semitendinosus m.
Adductor brevis
Semimembranosus m.
Deep femoral a. and v.
Adductor magnus
Rectus femoris tendon
Posterior femoral intermuscular septum
Vastus intermedius m.
Sciatic n.
Iliotibial tract
Vastus medialis m.
Vastus lateralis m.
Sartorius m.
Articularis genus m.
Saphenous n. and descending genicular a.
Lateral femoral intermuscular septum
Great saphenous v.
Femur
Gracilis m.
Biceps femoris m.
Adductor magnus tendon
Common fibular n.
Popliteal v. and a.
Semimembranosus m.
Tibial n.
Semitendinosus m.
F. Netter M.D.



Medial view

Vastus medialis m.
Quadriceps femoris tendon
Medial epicondyle of femur
Patella
Medial patellar retinaculum
Knee joint capsule
Patellar ligament
Tibial tuberosity
Sartorius m. (*cut*)
Gracilis m. (*cut*)
Semitendinosus tendon (*cut*)
Semimembranosus m. and tendon
Adductor magnus tendon
Tibial collateral ligament
Semimembranosus bursa
Anserine bursa
Semitendinosus tendon
Gracilis tendon
Sartorius tendon
Pes anserinus
Gastrocnemius m.
Soleus m.



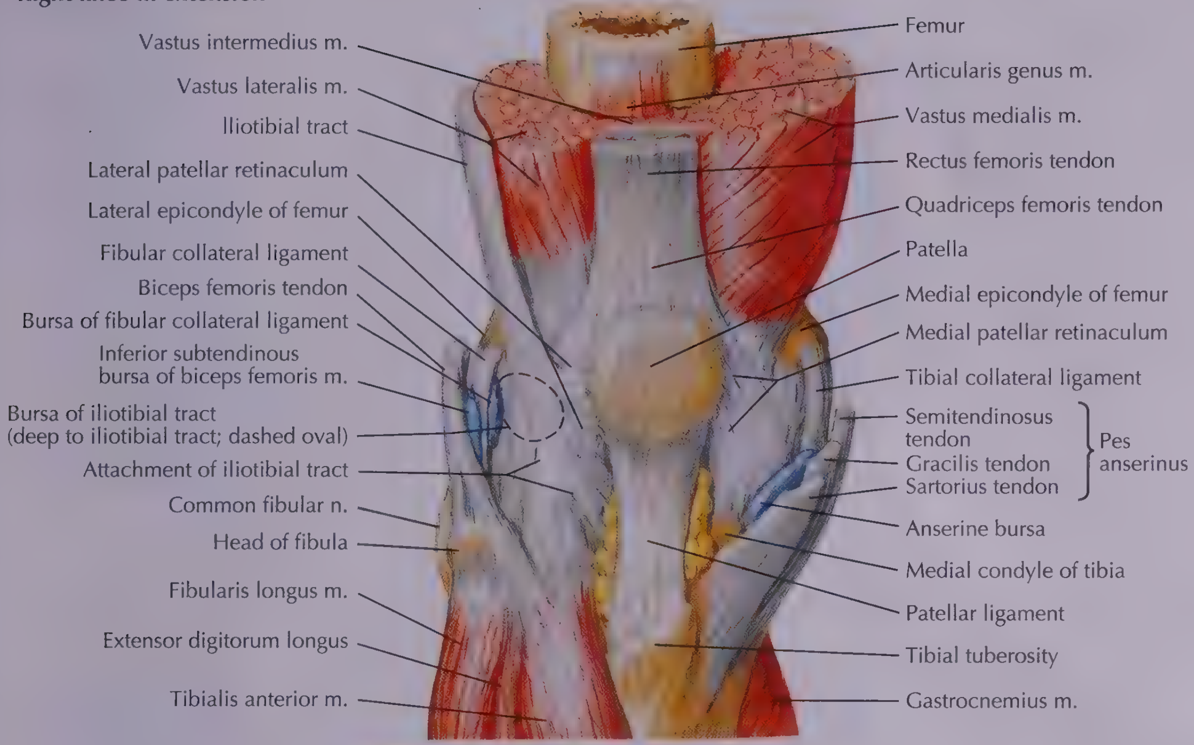
Lateral view

Iliotibial tract (*cut*)
Biceps femoris m. (*cut*)
Long head
Short head
Bursa of iliotibial tract
Fibular collateral ligament
Bursa of fibular collateral ligament
Plantaris m.
Inferior subtendinous bursa of biceps femoris m.
Biceps femoris tendon
Common fibular n.
Head of fibula
Gastrocnemius m.
Soleus m.
Fibularis longus m.
Vastus lateralis m.
Quadriceps femoris tendon
Patella
Lateral patellar retinaculum
Knee joint capsule
Patellar ligament
Tibial tuberosity
Tibialis anterior m.
F. Netter M.D.

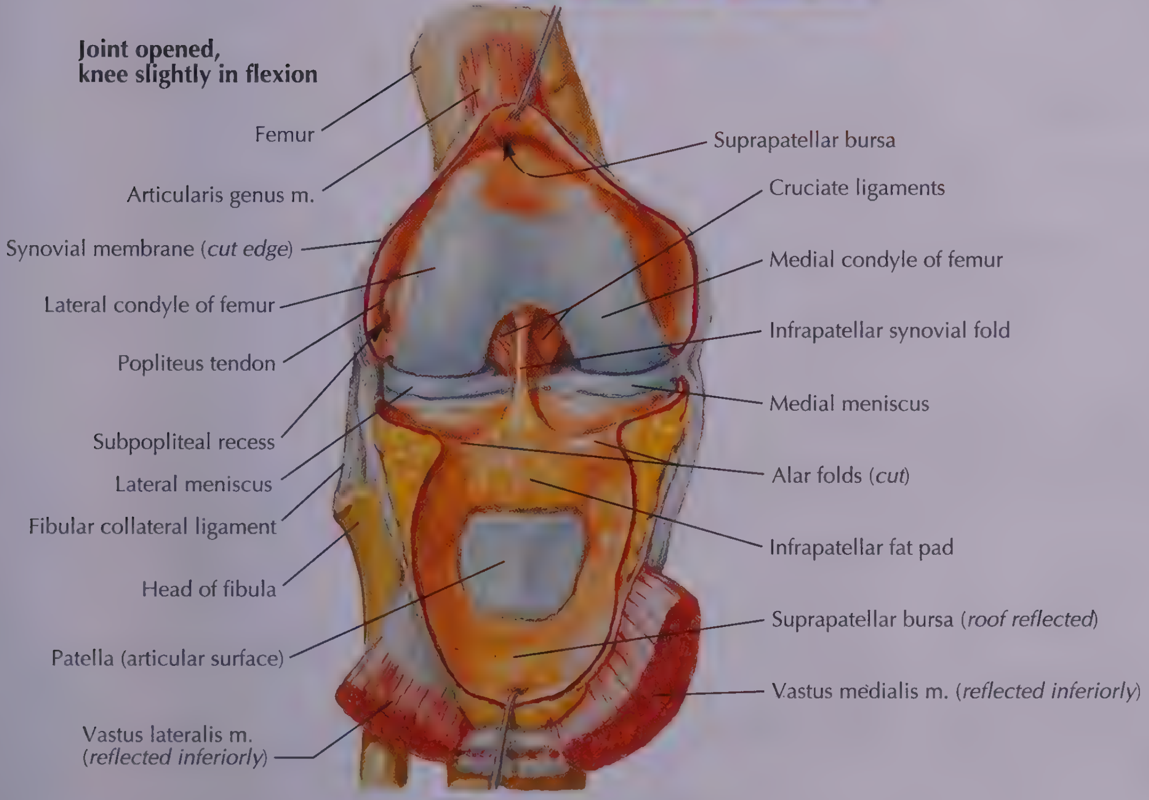
Knee: Anterior Views

See also Plates 520, BP 107

Right knee in extension


Vastus intermedius m.
Vastus lateralis m.
Iliotibial tract
Lateral patellar retinaculum
Lateral epicondyle of femur
Fibular collateral ligament
Biceps femoris tendon
Bursa of fibular collateral ligament
Inferior subtendinous bursa of biceps femoris m.
Bursa of iliotibial tract (deep to iliotibial tract; dashed oval)
Attachment of iliotibial tract
Common fibular n.
Head of fibula
Fibularis longus m.
Extensor digitorum longus
Tibialis anterior m.
Femur
Articularis genus m.
Vastus medialis m.
Rectus femoris tendon
Quadriceps femoris tendon
Patella
Medial epicondyle of femur
Medial patellar retinaculum
Tibial collateral ligament
Semitendinosus tendon
Gracilis tendon
Sartorius tendon
Pes anserinus
Anserine bursa
Medial condyle of tibia
Patellar ligament
Tibial tuberosity
Gastrocnemius m.

Joint opened, knee slightly in flexion

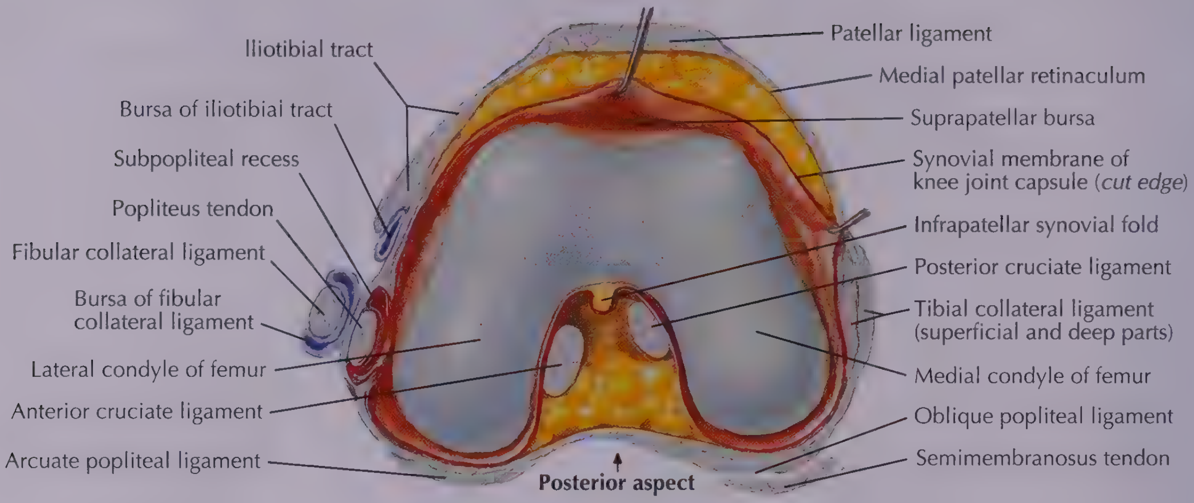

Femur
Articularis genus m.
Synovial membrane (*cut edge*)
Lateral condyle of femur
Popliteus tendon
Subpopliteal recess
Lateral meniscus
Fibular collateral ligament
Head of fibula
Patella (articular surface)
Vastus lateralis m. (*reflected inferiorly*)
Suprapatellar bursa
Cruciate ligaments
Medial condyle of femur
Infrapatellar synovial fold
Medial meniscus
Alar folds (*cut*)
Infrapatellar fat pad
Suprapatellar bursa (*roof reflected*)
Vastus medialis m. (*reflected inferiorly*)

F. Netter M.D.

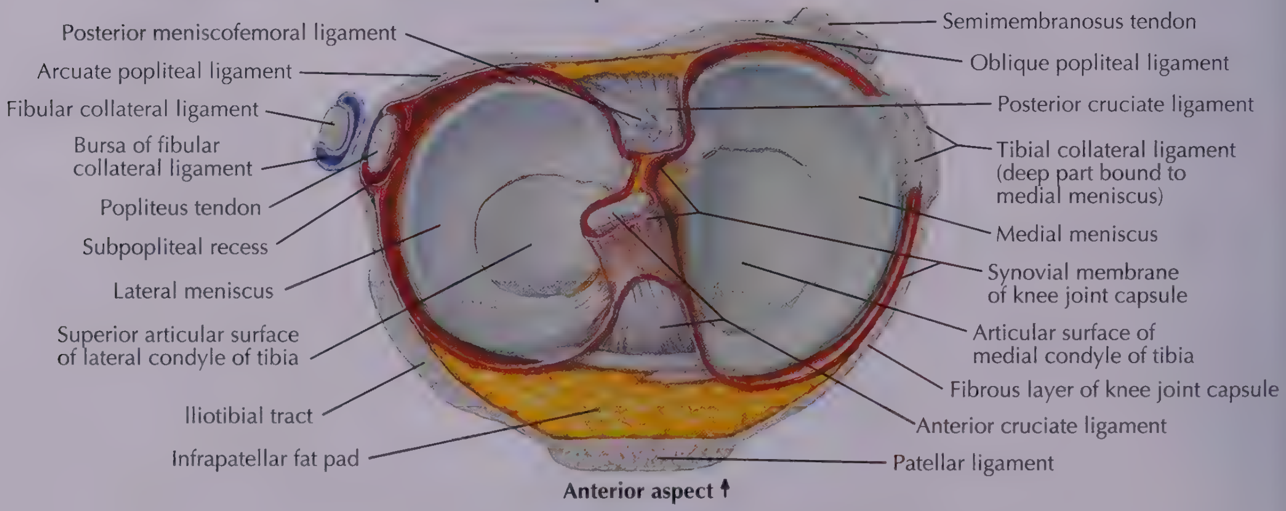
Knee: Interior Views

See also Plate 525

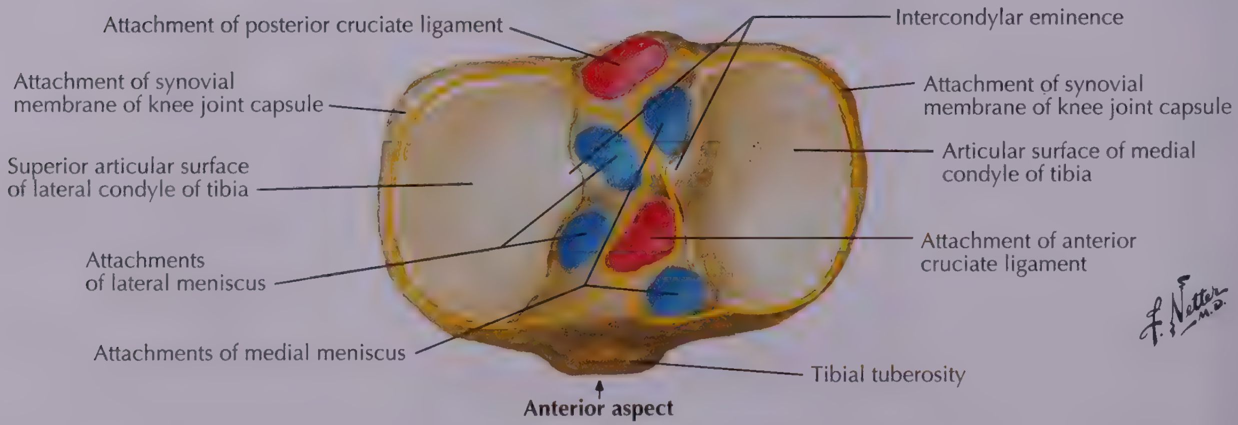
Inferior view


Iliotibial tract
Bursa of iliotibial tract
Subpopliteal recess
Popliteus tendon
Fibular collateral ligament
Bursa of fibular collateral ligament
Lateral condyle of femur
Anterior cruciate ligament
Arcuate popliteal ligament
Posterior aspect
Patellar ligament
Medial patellar retinaculum
Suprapatellar bursa
Synovial membrane of knee joint capsule (*cut edge*)
Infrapatellar synovial fold
Posterior cruciate ligament
Tibial collateral ligament (superficial and deep parts)
Medial condyle of femur
Oblique popliteal ligament
Semimembranosus tendon

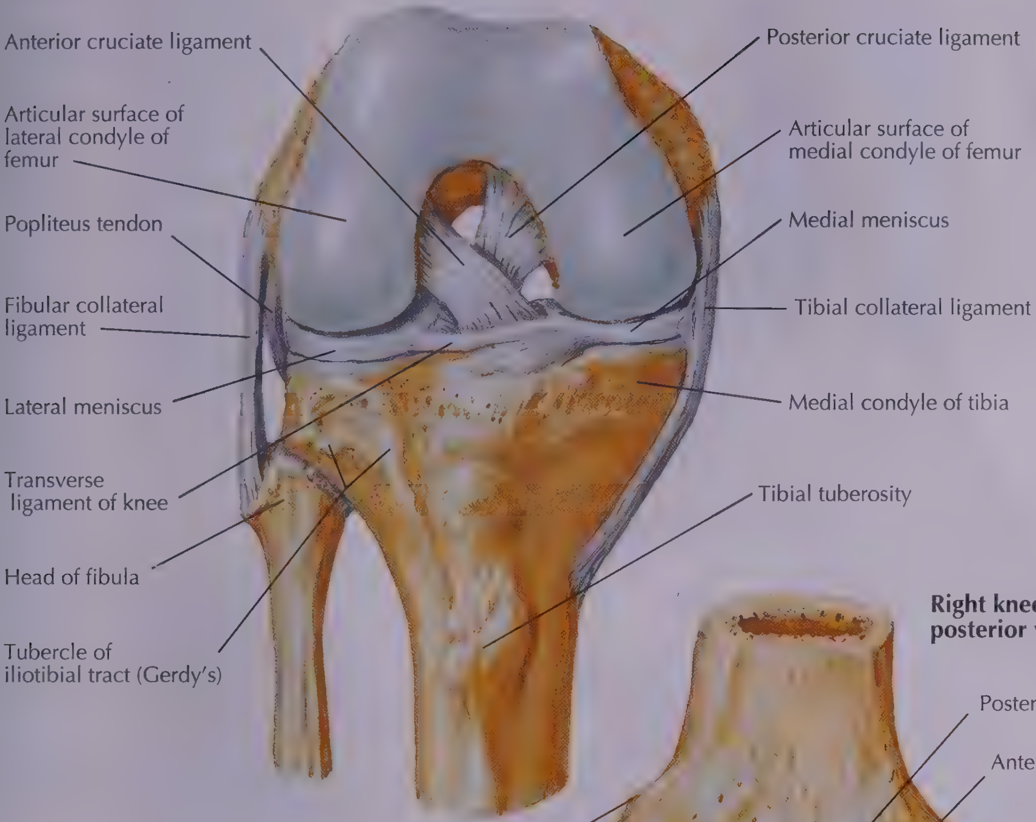
Superior view


Posterior meniscofemoral ligament
Arcuate popliteal ligament
Fibular collateral ligament
Bursa of fibular collateral ligament
Popliteus tendon
Subpopliteal recess
Lateral meniscus
Superior articular surface of lateral condyle of tibia
Iliotibial tract
Infrapatellar fat pad
Anterior aspect
Semimembranosus tendon
Oblique popliteal ligament
Posterior cruciate ligament
Tibial collateral ligament (deep part bound to medial meniscus)
Medial meniscus
Synovial membrane of knee joint capsule
Articular surface of medial condyle of tibia
Fibrous layer of knee joint capsule
Anterior cruciate ligament
Patellar ligament

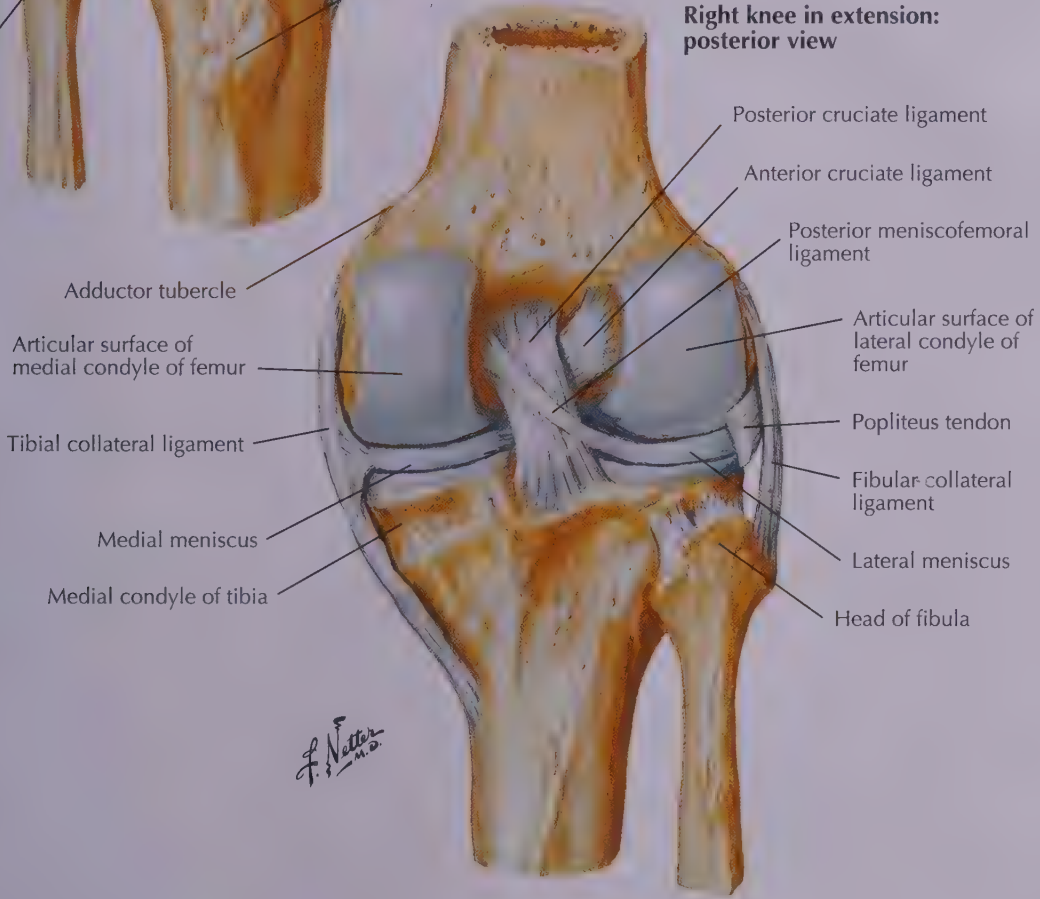
Superior view: ligaments and cartilage removed


Attachment of posterior cruciate ligament
Attachment of synovial membrane of knee joint capsule
Superior articular surface of lateral condyle of tibia
Attachments of lateral meniscus
Attachments of medial meniscus
Anterior aspect
Intercondylar eminence
Attachment of synovial membrane of knee joint capsule
Articular surface of medial condyle of tibia
Attachment of anterior cruciate ligament
Tibial tuberosity

Right knee in flexion: anterior view


Anterior cruciate ligament
Articular surface of lateral condyle of femur
Popliteus tendon
Fibular collateral ligament
Lateral meniscus
Transverse ligament of knee
Head of fibula
Tubercle of iliotibial tract (Gerdy's)
Posterior cruciate ligament
Articular surface of medial condyle of femur
Medial meniscus
Tibial collateral ligament
Medial condyle of tibia
Tibial tuberosity

Right knee in extension: posterior view


Posterior cruciate ligament
Anterior cruciate ligament
Posterior meniscofemoral ligament
Articular surface of lateral condyle of femur
Popliteus tendon
Fibular collateral ligament
Lateral meniscus
Head of fibula
Adductor tubercle
Articular surface of medial condyle of femur
Tibial collateral ligament
Medial meniscus
Medial condyle of tibia
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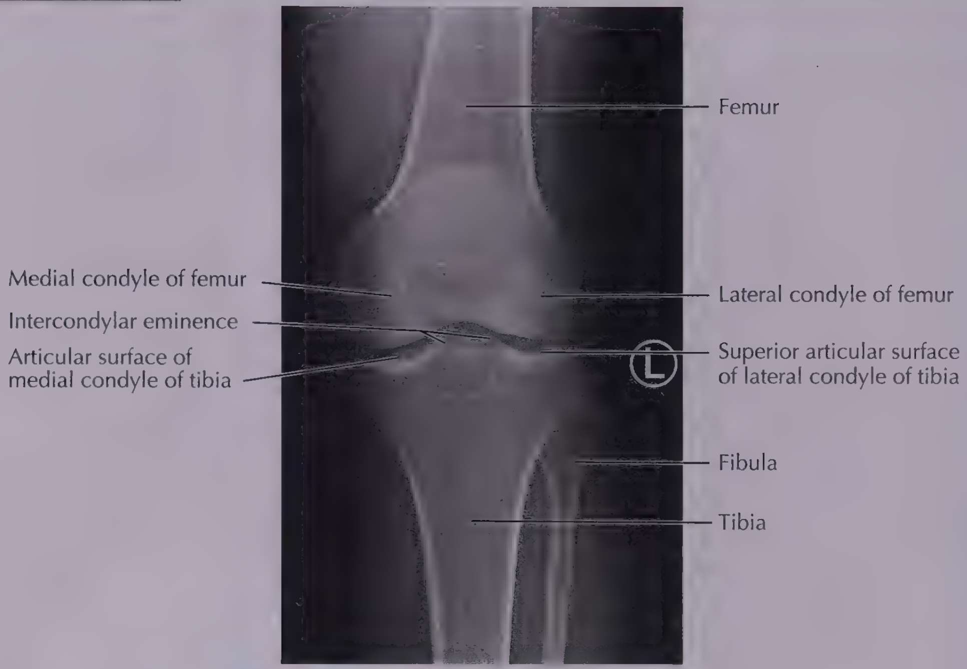
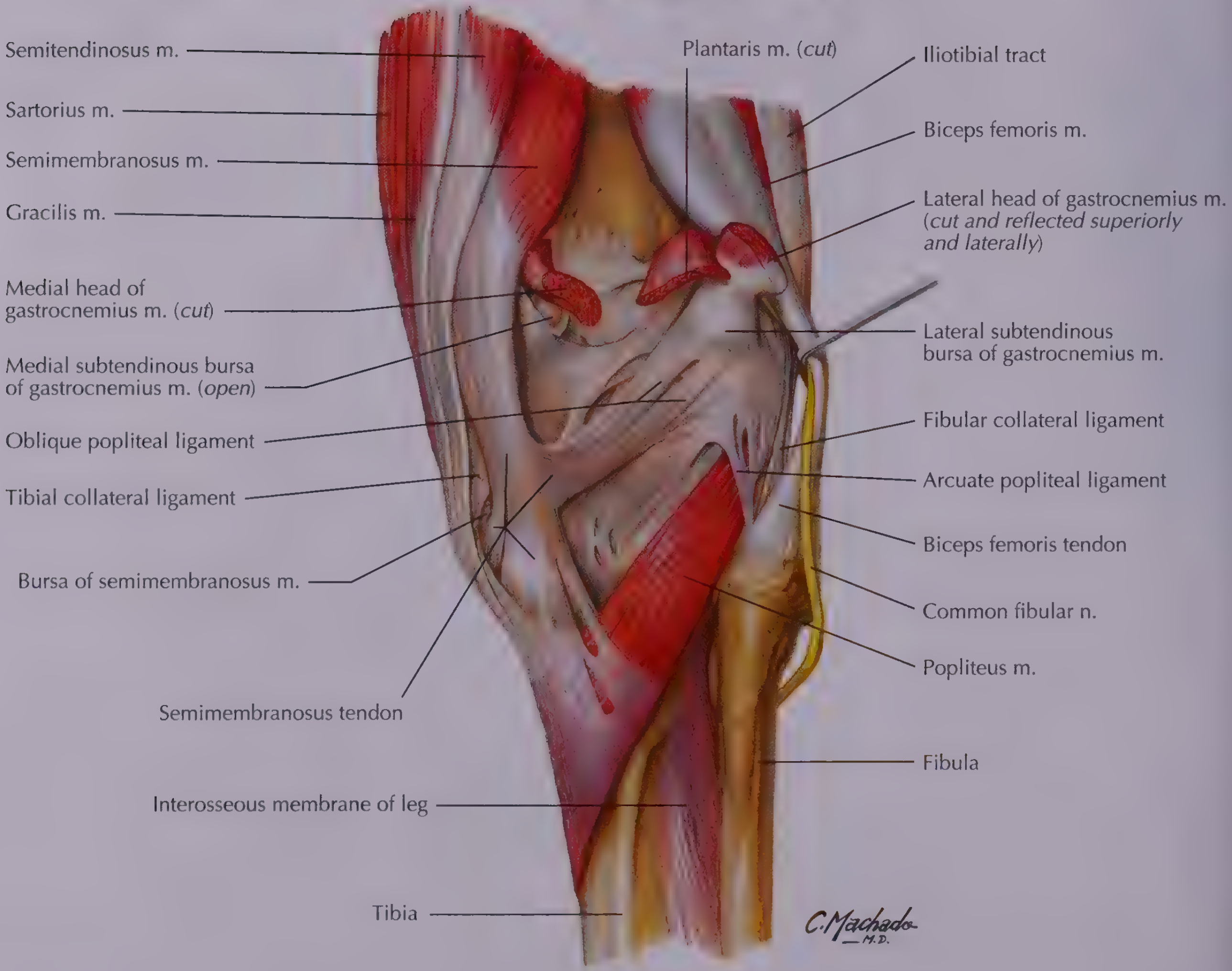
Knee: Anteroposterior Radiograph and Posterior View

See also Plates 517, BP 107



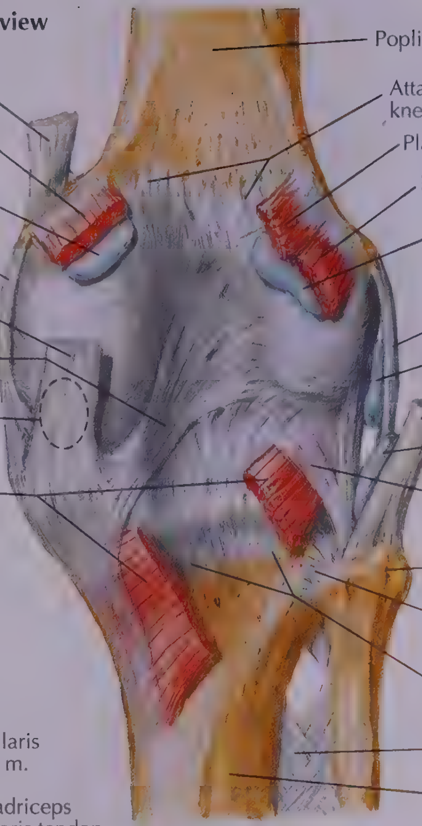
Femur
Medial condyle of femur
Lateral condyle of femur
Intercondylar eminence
Articular surface of medial condyle of tibia
Superior articular surface of lateral condyle of tibia
L
Fibula
Tibia

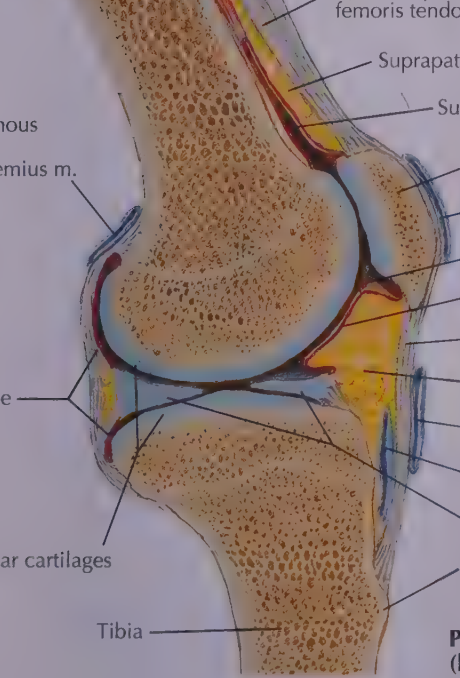


Semitendinosus m.
Plantaris m. (*cut*)
Iliotibial tract
Sartorius m.
Biceps femoris m.
Semimembranosus m.
Gracilis m.
Lateral head of gastrocnemius m. (*cut and reflected superiorly and laterally*)
Medial head of gastrocnemius m. (*cut*)
Lateral subtendinous bursa of gastrocnemius m.
Medial subtendinous bursa of gastrocnemius m. (*open*)
Fibular collateral ligament
Oblique popliteal ligament
Arcuate popliteal ligament
Tibial collateral ligament
Biceps femoris tendon
Bursa of semimembranosus m.
Common fibular n.
Popliteus m.
Semimembranosus tendon
Fibula
Interosseous membrane of leg
Tibia

See also Plates BP 107, BP 108

Right knee: posterior view


Adductor magnus tendon
Medial head of gastrocnemius m.
Medial subtendinous bursa of gastrocnemius m.
Tibial collateral ligament
Semimembranosus tendon
Oblique popliteal ligament
Semimembranosus bursa (deep to tendon; *broken line*)
Popliteus m.
Popliteal surface of femur
Attachment of fibrous layer of knee joint capsule
Plantaris m.
Lateral head of gastrocnemius m.
Lateral subtendinous bursa of gastrocnemius m.
Fibular collateral ligament
Bursa of fibular collateral ligament
Biceps femoris tendon
Inferior subtendinous bursa of biceps femoris m.
Arcuate popliteal ligament
Head of fibula
Posterior ligament of fibular head
Attachment of fibrous layer of knee joint capsule
Interosseous membrane of leg
Tibia


Femur
Articularis genus m.
Quadriceps femoris tendon
Suprapatellar fat pad
Suprapatellar bursa
Lateral subtendinous bursa of gastrocnemius m.
Patella
Subcutaneous prepatellar bursa
Articular cavity
Synovial membrane of knee joint capsule
Synovial membrane
Patellar ligament
Infrapatellar fat pad
Subcutaneous infrapatellar bursa
Deep infrapatellar bursa
Lateral meniscus
Articular cartilages
Tibial tuberosity
Tibia

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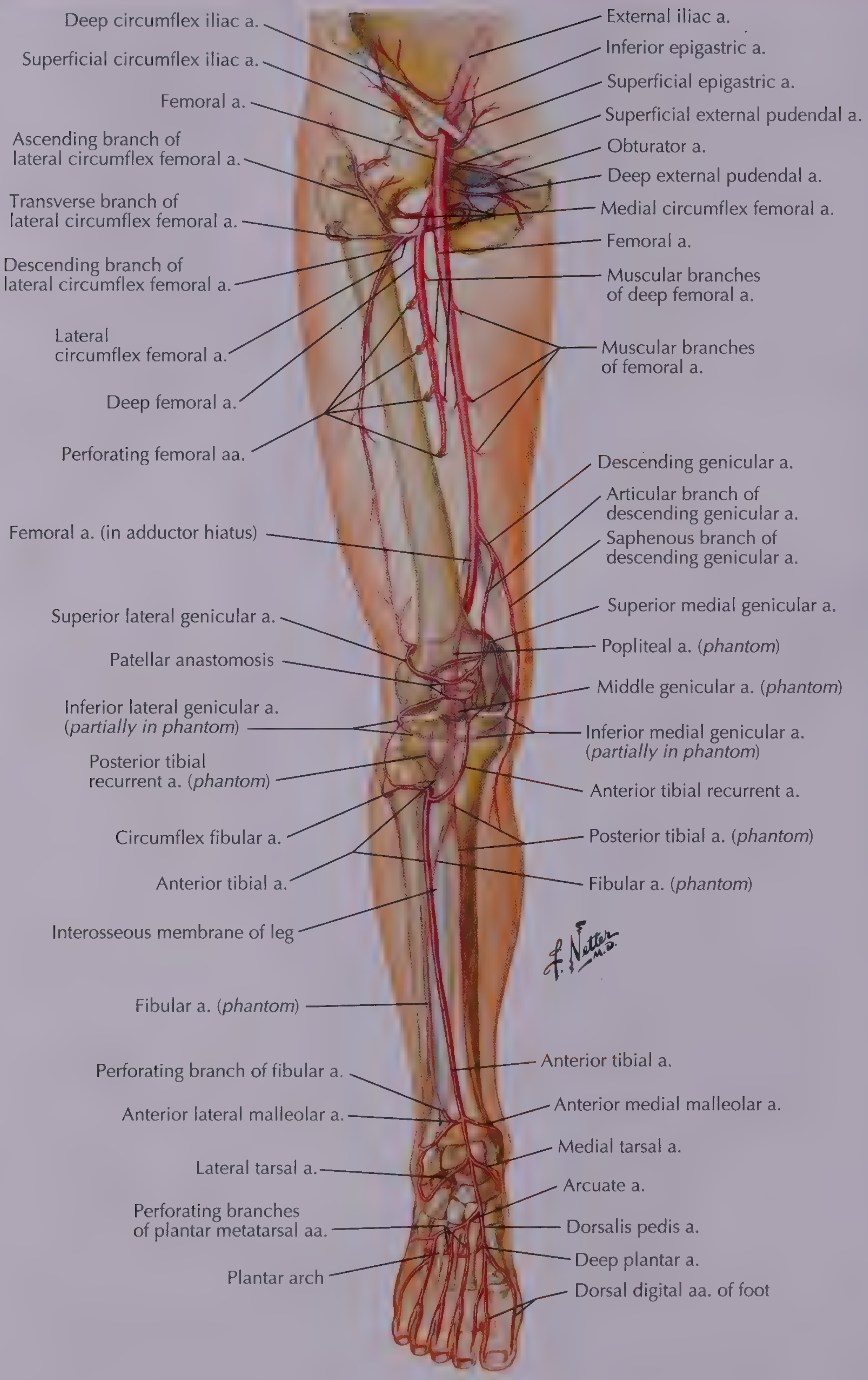
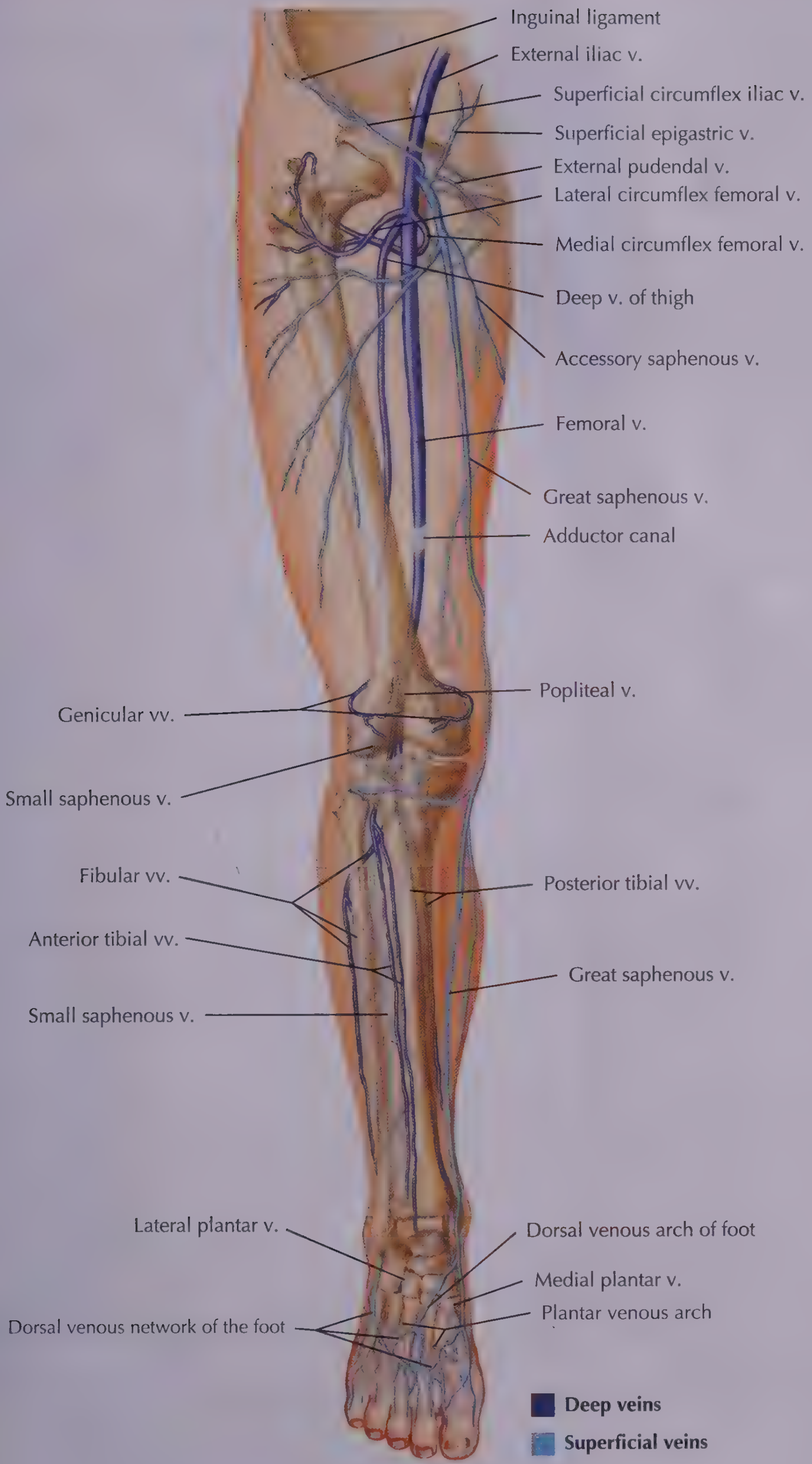
Parasagittal section (lateral to midline of knee)

Arteries of Lower Limb

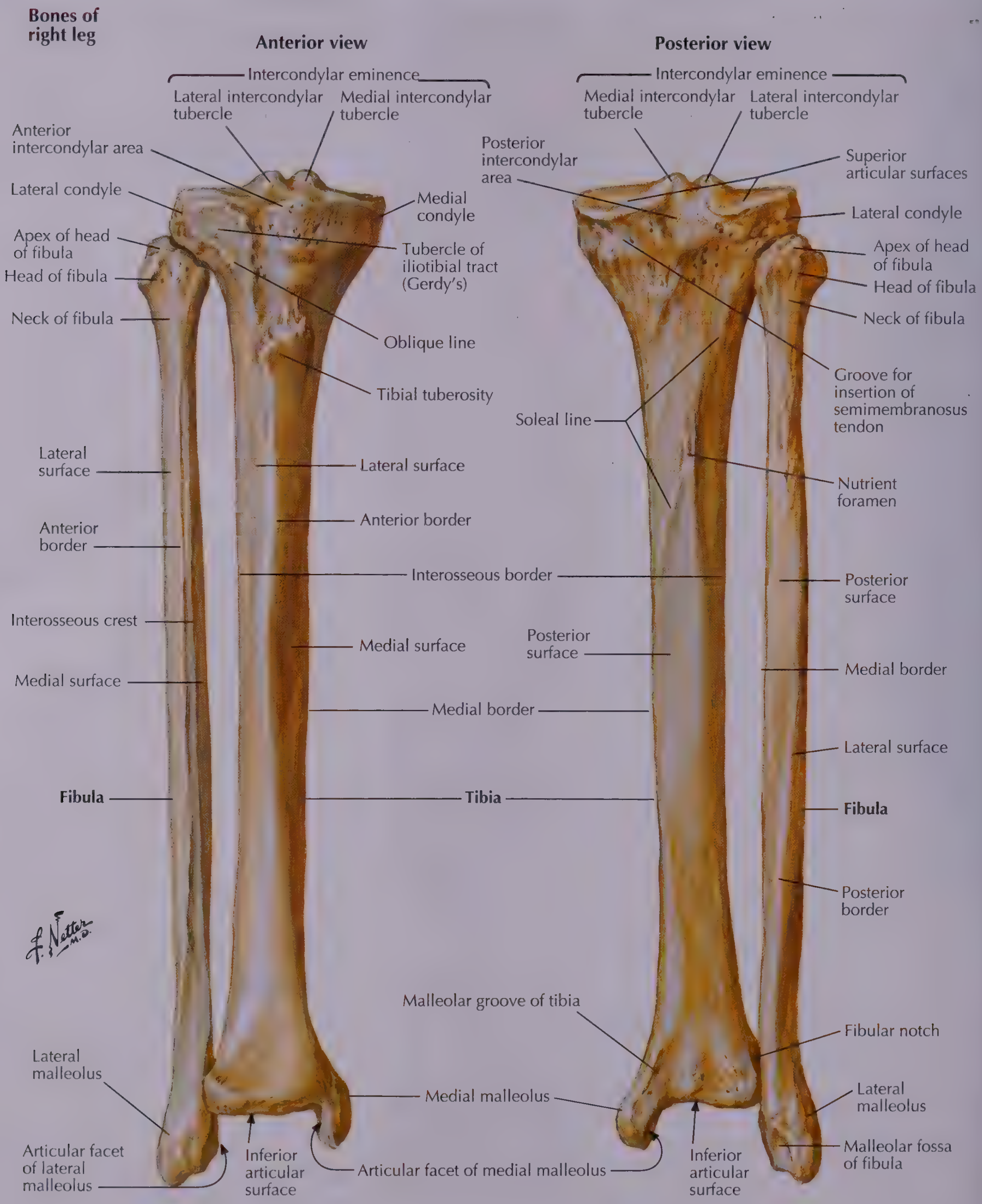
See also Plates 514, 532, BP 103


Deep circumflex iliac a.
Superficial circumflex iliac a.
Femoral a.
Ascending branch of lateral circumflex femoral a.
Transverse branch of lateral circumflex femoral a.
Descending branch of lateral circumflex femoral a.
Lateral circumflex femoral a.
Deep femoral a.
Perforating femoral aa.
Femoral a. (in adductor hiatus)
Superior lateral genicular a.
Patellar anastomosis
Inferior lateral genicular a. (*partially in phantom*)
Posterior tibial recurrent a. (*phantom*)
Circumflex fibular a.
Anterior tibial a.
Interosseous membrane of leg
Fibular a. (*phantom*)
Perforating branch of fibular a.
Anterior lateral malleolar a.
Lateral tarsal a.
Perforating branches of plantar metatarsal aa.
Plantar arch
External iliac a.
Inferior epigastric a.
Superficial epigastric a.
Superficial external pudendal a.
Obturator a.
Deep external pudendal a.
Medial circumflex femoral a.
Femoral a.
Muscular branches of deep femoral a.
Muscular branches of femoral a.
Descending genicular a.
Articular branch of descending genicular a.
Saphenous branch of descending genicular a.
Superior medial genicular a.
Popliteal a. (*phantom*)
Middle genicular a. (*phantom*)
Inferior medial genicular a. (*partially in phantom*)
Anterior tibial recurrent a.
Posterior tibial a. (*phantom*)
Fibular a. (*phantom*)
Anterior tibial a.
Anterior medial malleolar a.
Medial tarsal a.
Arcuate a.
Dorsalis pedis a.
Deep plantar a.
Dorsal digital aa. of foot

Veins of Lower Limb


Inguinal ligament
External iliac v.
Superficial circumflex iliac v.
Superficial epigastric v.
External pudendal v.
Lateral circumflex femoral v.
Medial circumflex femoral v.
Deep v. of thigh
Accessory saphenous v.
Femoral v.
Great saphenous v.
Adductor canal
Popliteal v.
Genicular vv.
Small saphenous v.
Fibular vv.
Posterior tibial vv.
Anterior tibial vv.
Great saphenous v.
Small saphenous v.
Lateral plantar v.
Dorsal venous arch of foot
Medial plantar v.
Plantar venous arch
Dorsal venous network of the foot
Deep veins
Superficial veins

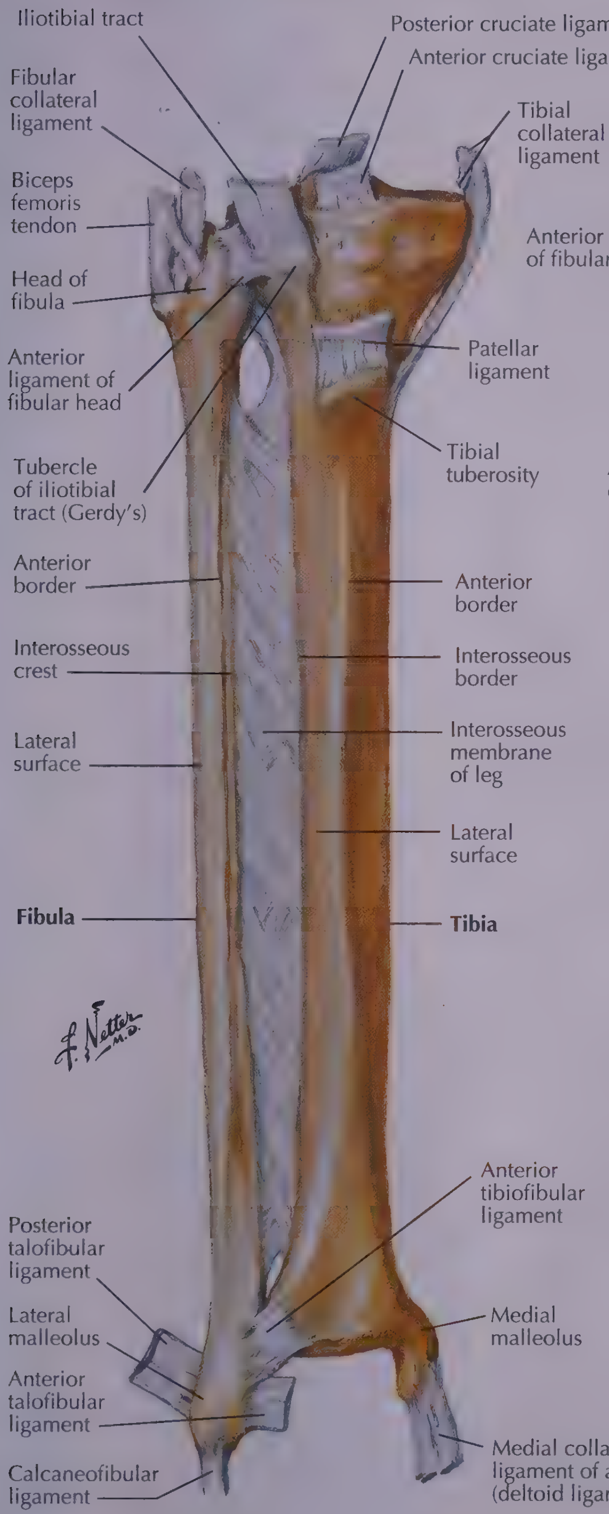
Tibia and Fibula: Anterior and Posterior Views


Bones of right leg
Anterior view
Intercondylar eminence
Lateral intercondylar tubercle
Medial intercondylar tubercle
Anterior intercondylar area
Lateral condyle
Apex of head of fibula
Head of fibula
Neck of fibula
Medial condyle
Tubercle of iliotibial tract (Gerdy's)
Oblique line
Tibial tuberosity
Lateral surface
Lateral surface
Anterior border
Anterior border
Interosseous border
Interosseous crest
Medial surface
Medial surface
Medial border
Fibula
Tibia
Lateral malleolus
Medial malleolus
Articular facet of lateral malleolus
Inferior articular surface
Articular facet of medial malleolus
Posterior view
Intercondylar eminence
Medial intercondylar tubercle
Lateral intercondylar tubercle
Posterior intercondylar area
Superior articular surfaces
Lateral condyle
Apex of head of fibula
Head of fibula
Neck of fibula
Groove for insertion of semimembranosus tendon
Soleal line
Nutrient foramen
Posterior surface
Posterior surface
Medial border
Lateral surface
Fibula
Posterior border
Malleolar groove of tibia
Fibular notch
Lateral malleolus
Malleolar fossa of fibula
Inferior articular surface

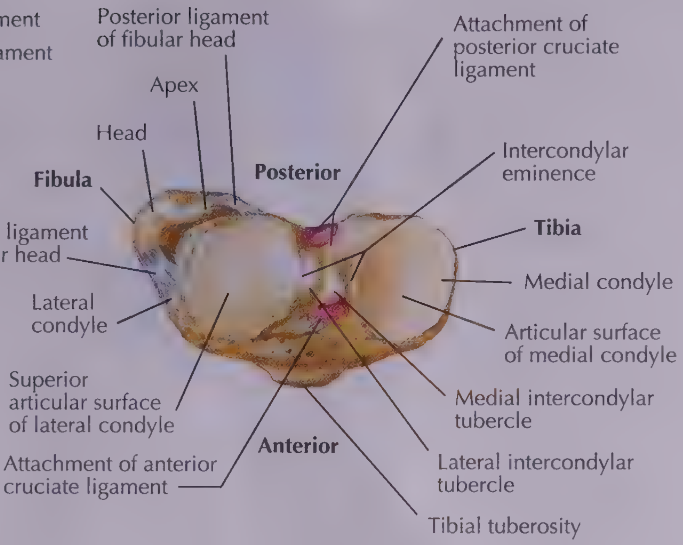
Tibia and Fibula: Additional Views and Cross Section

See also Plate 518

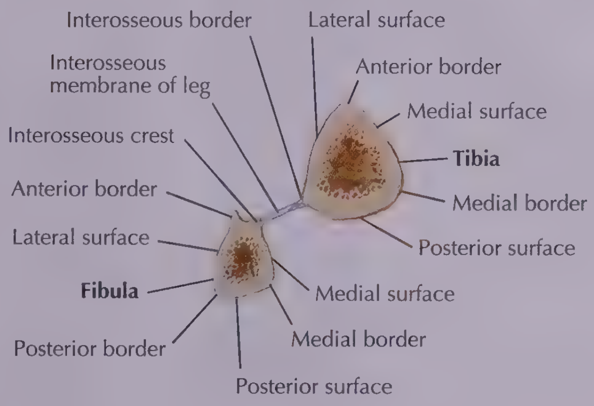
Anterior view with ligament attachments


Iliotibial tract
Posterior cruciate ligament
Anterior cruciate ligament
Fibular collateral ligament
Tibial collateral ligament
Biceps femoris tendon
Head of fibula
Patellar ligament
Anterior ligament of fibular head
Tibial tuberosity
Tubercle of iliotibial tract (Gerdy's)
Anterior border
Anterior border
Interosseous crest
Interosseous border
Interosseous membrane of leg
Lateral surface
Lateral surface
Fibula
Tibia
Anterior tibiofibular ligament
Posterior talofibular ligament
Lateral malleolus
Medial malleolus
Anterior talofibular ligament
Calcaneofibular ligament
Medial collateral ligament of ankle (deltoid ligament)
F. Netter M.D.

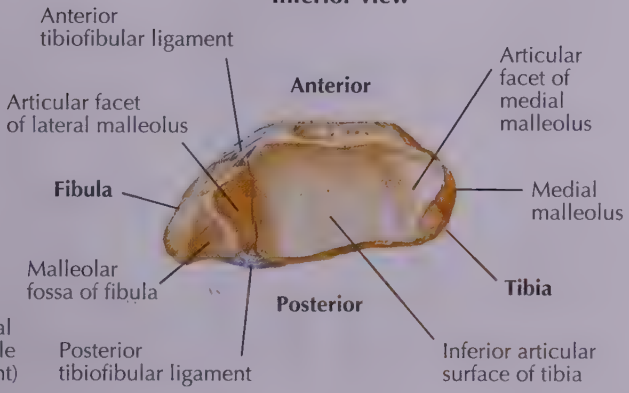
Superior view


Posterior ligament of fibular head
Attachment of posterior cruciate ligament
Apex
Head
Posterior
Intercondylar eminence
Fibula
Tibia
Anterior ligament of fibular head
Medial condyle
Lateral condyle
Articular surface of medial condyle
Superior articular surface of lateral condyle
Medial intercondylar tubercle
Anterior
Attachment of anterior cruciate ligament
Lateral intercondylar tubercle
Tibial tuberosity

Cross section

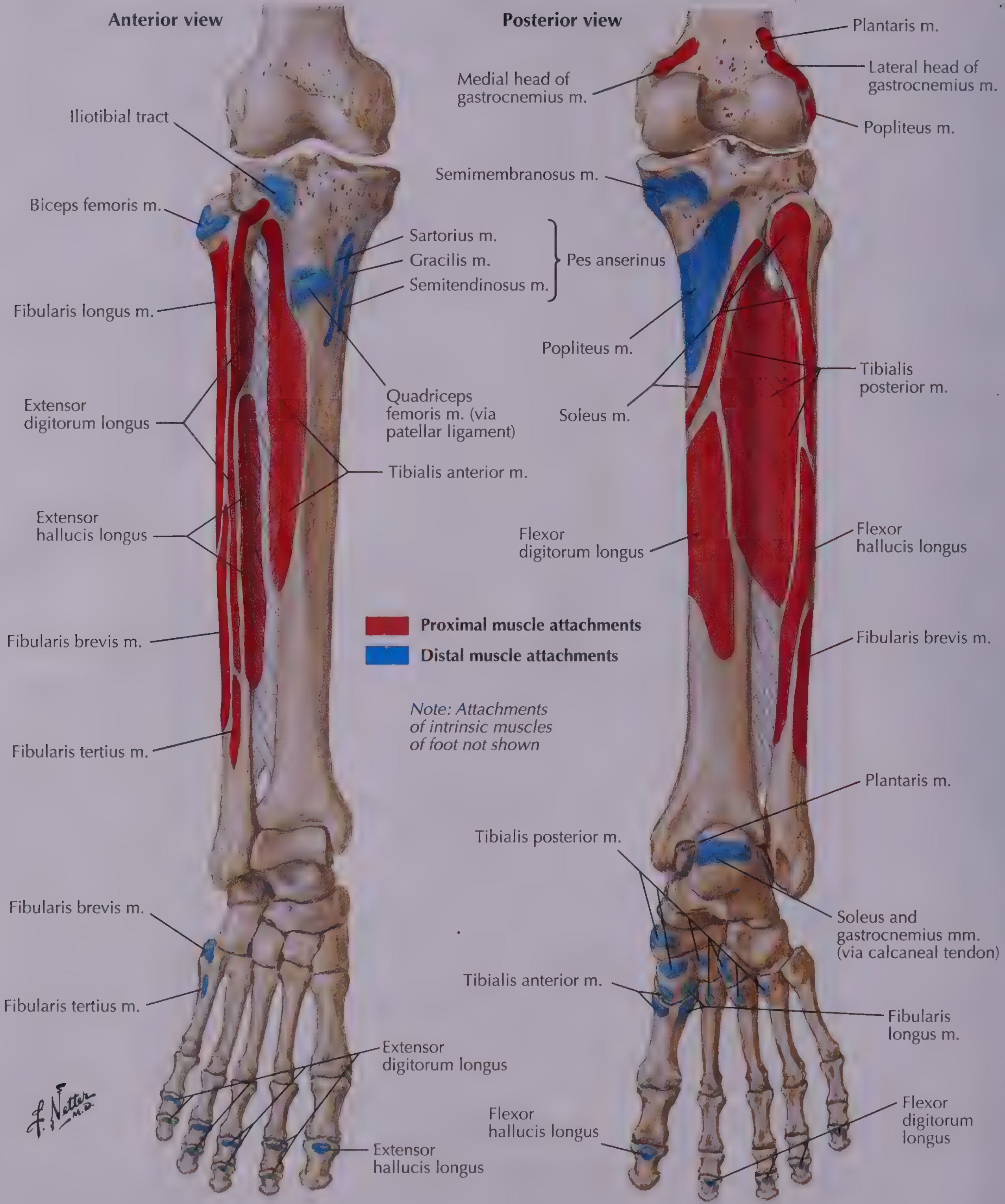

Interosseous border
Lateral surface
Interosseous membrane of leg
Anterior border
Medial surface
Interosseous crest
Tibia
Anterior border
Medial border
Lateral surface
Posterior surface
Fibula
Medial surface
Posterior border
Medial border
Posterior surface

Inferior view


Anterior tibiofibular ligament
Anterior
Articular facet of medial malleolus
Articular facet of lateral malleolus
Fibula
Medial malleolus
Malleolar fossa of fibula
Posterior
Tibia
Posterior tibiofibular ligament
Inferior articular surface of tibia

Attachments of Muscles of Leg

See also Plates 529, 532


Anterior view
Iliotibial tract
Biceps femoris m.
Fibularis longus m.
Extensor digitorum longus
Extensor hallucis longus
Fibularis brevis m.
Fibularis tertius m.
Sartorius m.
Gracilis m.
Semitendinosus m.
Pes anserinus
Quadriceps femoris m. (via patellar ligament)
Tibialis anterior m.
Fibularis brevis m.
Fibularis tertius m.
Extensor digitorum longus
Extensor hallucis longus
Posterior view
Medial head of gastrocnemius m.
Plantaris m.
Lateral head of gastrocnemius m.
Popliteus m.
Semimembranosus m.
Popliteus m.
Soleus m.
Tibialis posterior m.
Flexor digitorum longus
Flexor hallucis longus
Fibularis brevis m.
Plantaris m.
Tibialis posterior m.
Soleus and gastrocnemius mm. (via calcaneal tendon)
Tibialis anterior m.
Fibularis longus m.
Flexor hallucis longus
Flexor digitorum longus

🟥 **Proximal muscle attachments**

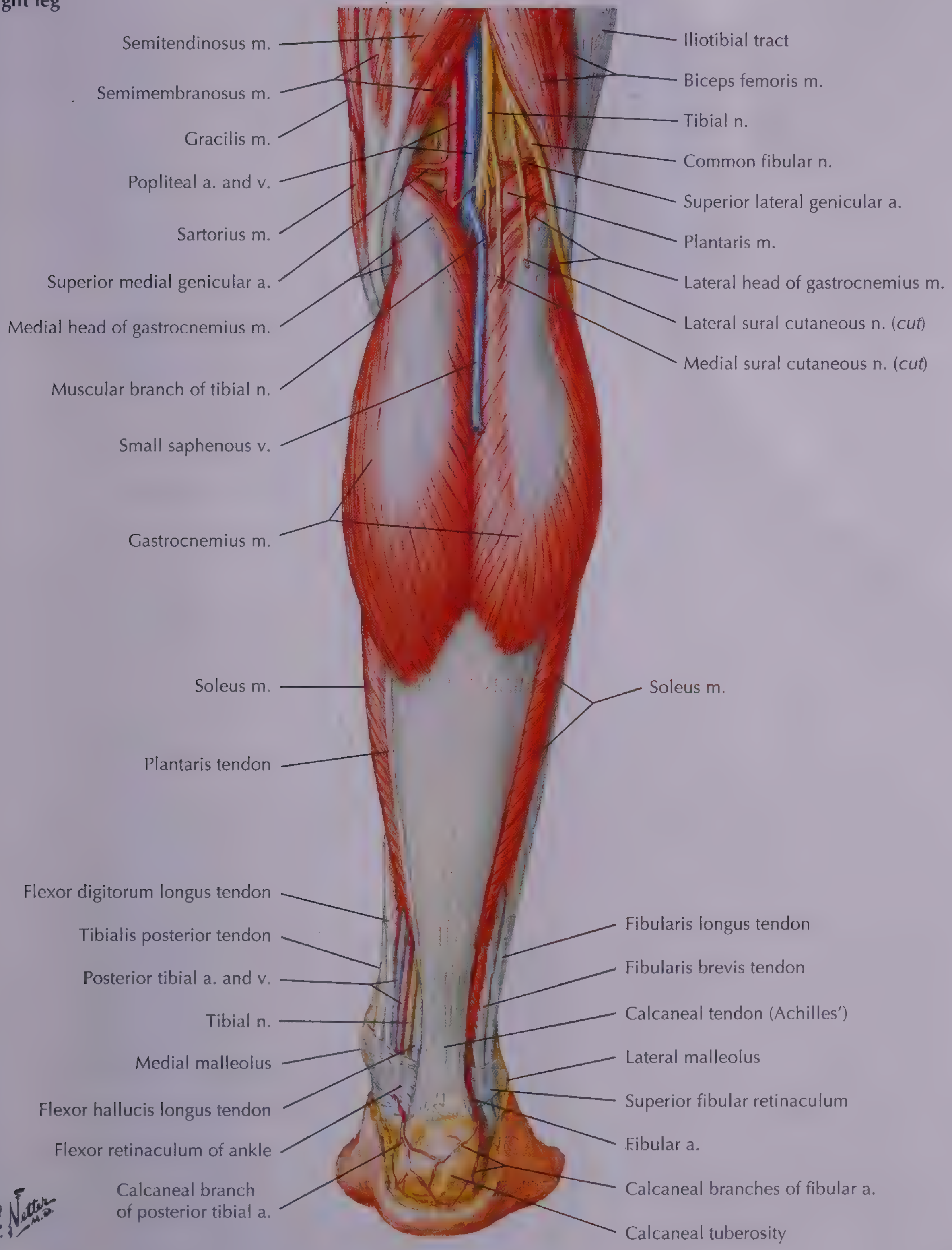
🟦 **Distal muscle attachments**

Note: Attachments of intrinsic muscles of foot not shown

Muscles of Leg: Superficial Part of Posterior Compartment

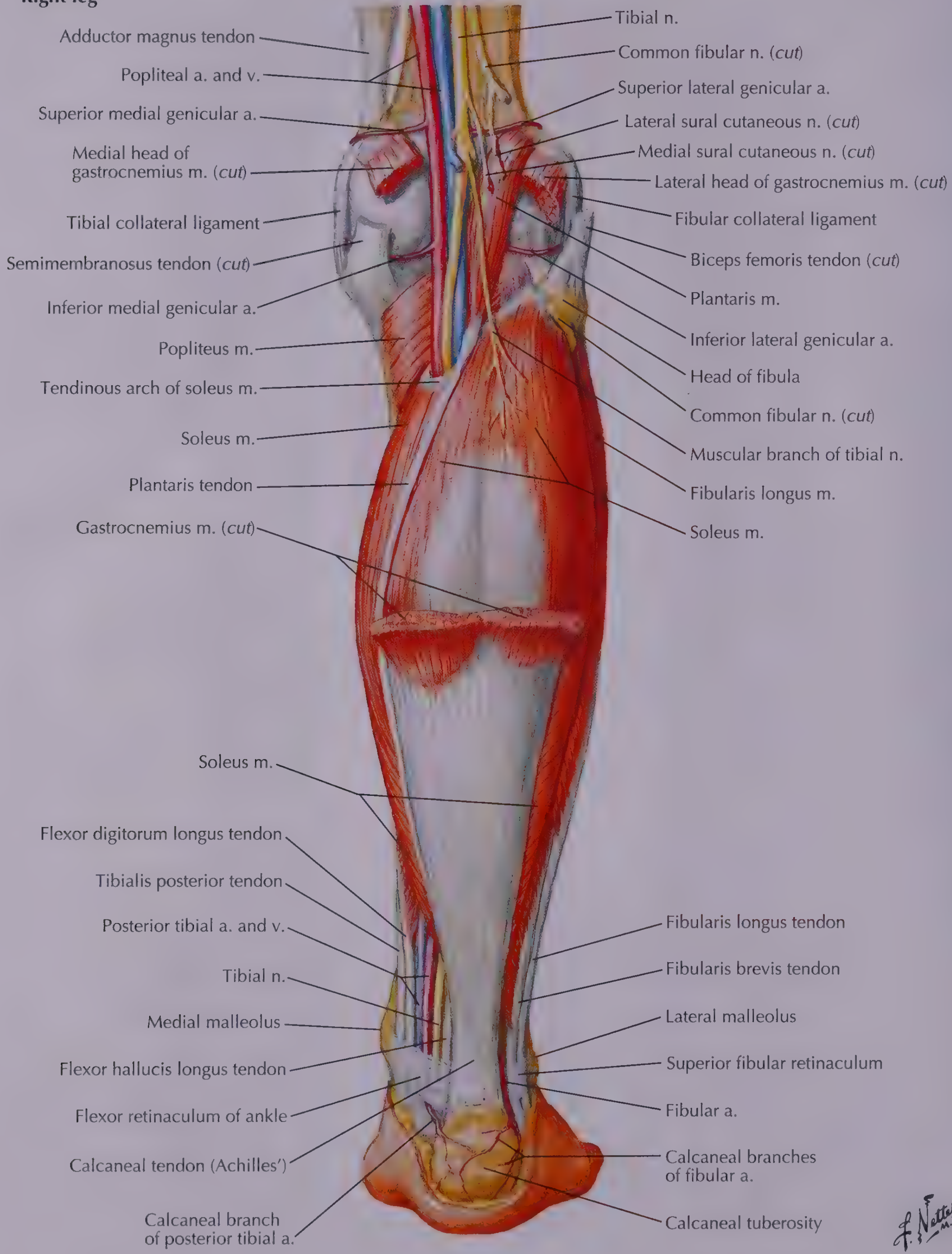
See also Plates 553, BP 106

Right leg


Semitendinosus m.
Semimembranosus m.
Gracilis m.
Popliteal a. and v.
Sartorius m.
Superior medial genicular a.
Medial head of gastrocnemius m.
Muscular branch of tibial n.
Small saphenous v.
Gastrocnemius m.
Soleus m.
Plantaris tendon
Flexor digitorum longus tendon
Tibialis posterior tendon
Posterior tibial a. and v.
Tibial n.
Medial malleolus
Flexor hallucis longus tendon
Flexor retinaculum of ankle
Calcaneal branch of posterior tibial a.
Iliotibial tract
Biceps femoris m.
Tibial n.
Common fibular n.
Superior lateral genicular a.
Plantaris m.
Lateral head of gastrocnemius m.
Lateral sural cutaneous n. (*cut*)
Medial sural cutaneous n. (*cut*)
Soleus m.
Fibularis longus tendon
Fibularis brevis tendon
Calcaneal tendon (Achilles')
Lateral malleolus
Superior fibular retinaculum
Fibular a.
Calcaneal branches of fibular a.
Calcaneal tuberosity

Muscles of Leg: Superficial Part of Posterior Compartment (Partial Dissection)

See also Plates 553, BP 105, BP 106

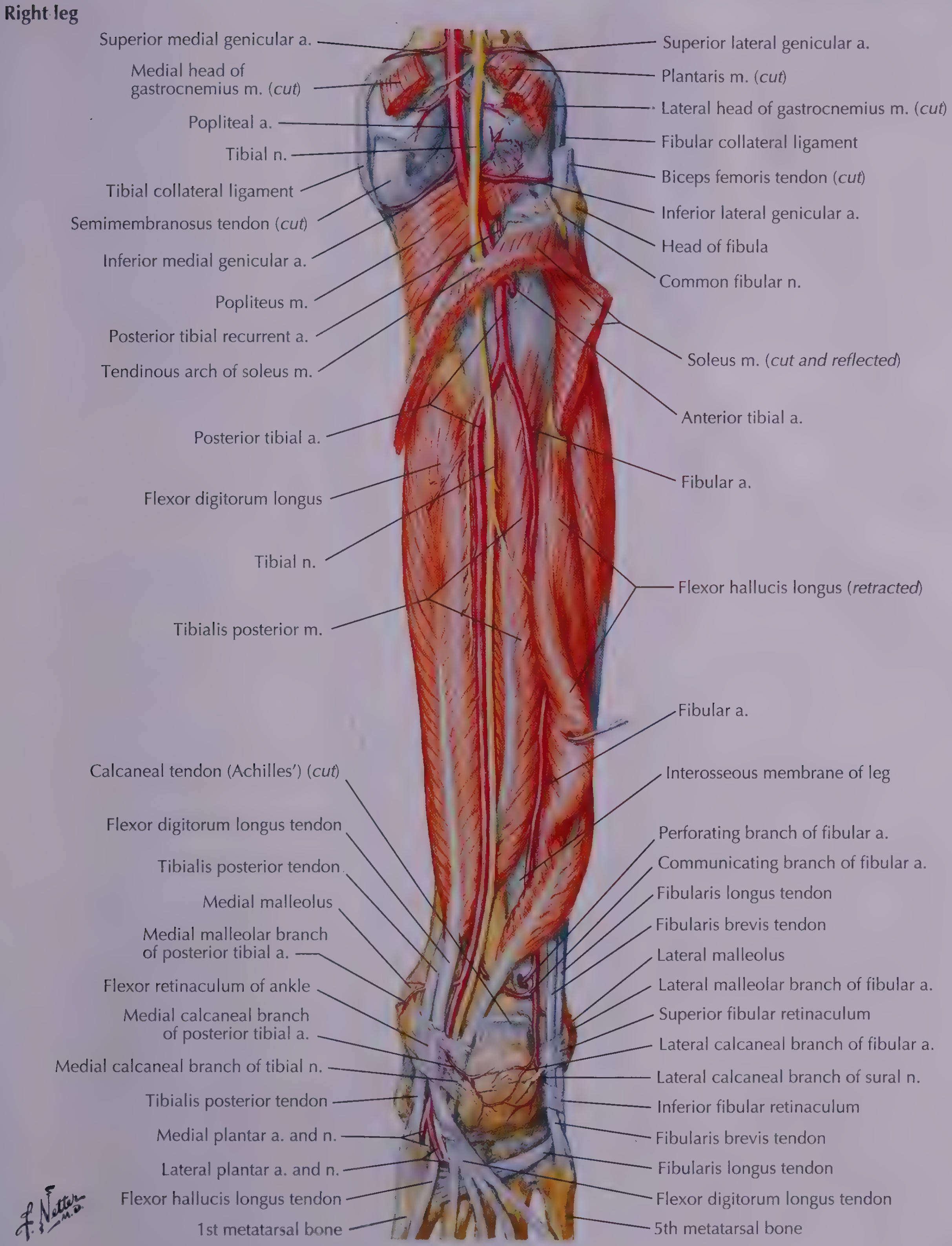


Right leg

Adductor magnus tendon
Popliteal a. and v.
Superior medial genicular a.
Medial head of gastrocnemius m. (*cut*)
Tibial collateral ligament
Semimembranosus tendon (*cut*)
Inferior medial genicular a.
Popliteus m.
Tendinous arch of soleus m.
Soleus m.
Plantaris tendon
Gastrocnemius m. (*cut*)
Soleus m.
Flexor digitorum longus tendon
Tibialis posterior tendon
Posterior tibial a. and v.
Tibial n.
Medial malleolus
Flexor hallucis longus tendon
Flexor retinaculum of ankle
Calcaneal tendon (Achilles')
Calcaneal branch of posterior tibial a.
Tibial n.
Common fibular n. (*cut*)
Superior lateral genicular a.
Lateral sural cutaneous n. (*cut*)
Medial sural cutaneous n. (*cut*)
Lateral head of gastrocnemius m. (*cut*)
Fibular collateral ligament
Biceps femoris tendon (*cut*)
Plantaris m.
Inferior lateral genicular a.
Head of fibula
Common fibular n. (*cut*)
Muscular branch of tibial n.
Fibularis longus m.
Soleus m.
Fibularis longus tendon
Fibularis brevis tendon
Lateral malleolus
Superior fibular retinaculum
Fibular a.
Calcaneal branches of fibular a.
Calcaneal tuberosity
F. Netter M.D.

Muscles of Leg: Deep Part of Posterior Compartment

See also Plates 553, BP 105, BP 106


Right leg
Superior medial genicular a.
Medial head of gastrocnemius m. (cut)
Popliteal a.
Tibial n.
Tibial collateral ligament
Semimembranosus tendon (cut)
Inferior medial genicular a.
Popliteus m.
Posterior tibial recurrent a.
Tendinous arch of soleus m.
Posterior tibial a.
Flexor digitorum longus
Tibial n.
Tibialis posterior m.
Calcaneal tendon (Achilles') (cut)
Flexor digitorum longus tendon
Tibialis posterior tendon
Medial malleolus
Medial malleolar branch of posterior tibial a.
Flexor retinaculum of ankle
Medial calcaneal branch of posterior tibial a.
Medial calcaneal branch of tibial n.
Tibialis posterior tendon
Medial plantar a. and n.
Lateral plantar a. and n.
Flexor hallucis longus tendon
1st metatarsal bone
Superior lateral genicular a.
Plantaris m. (cut)
Lateral head of gastrocnemius m. (cut)
Fibular collateral ligament
Biceps femoris tendon (cut)
Inferior lateral genicular a.
Head of fibula
Common fibular n.
Soleus m. (cut and reflected)
Anterior tibial a.
Fibular a.
Flexor hallucis longus (retracted)
Fibular a.
Interosseous membrane of leg
Perforating branch of fibular a.
Communicating branch of fibular a.
Fibularis longus tendon
Fibularis brevis tendon
Lateral malleolus
Lateral malleolar branch of fibular a.
Superior fibular retinaculum
Lateral calcaneal branch of fibular a.
Lateral calcaneal branch of sural n.
Inferior fibular retinaculum
Fibularis brevis tendon
Fibularis longus tendon
Flexor digitorum longus tendon
5th metatarsal bone
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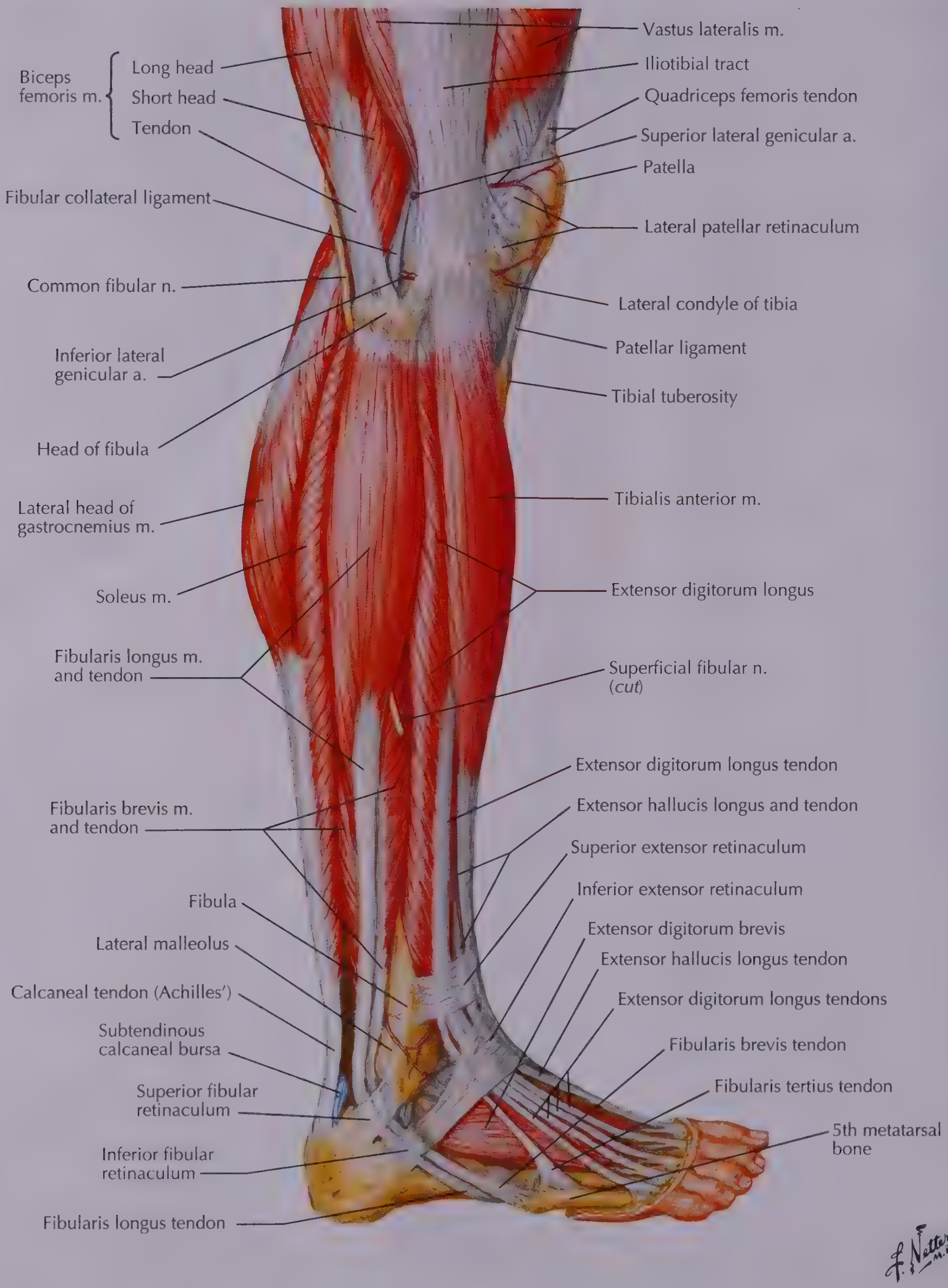
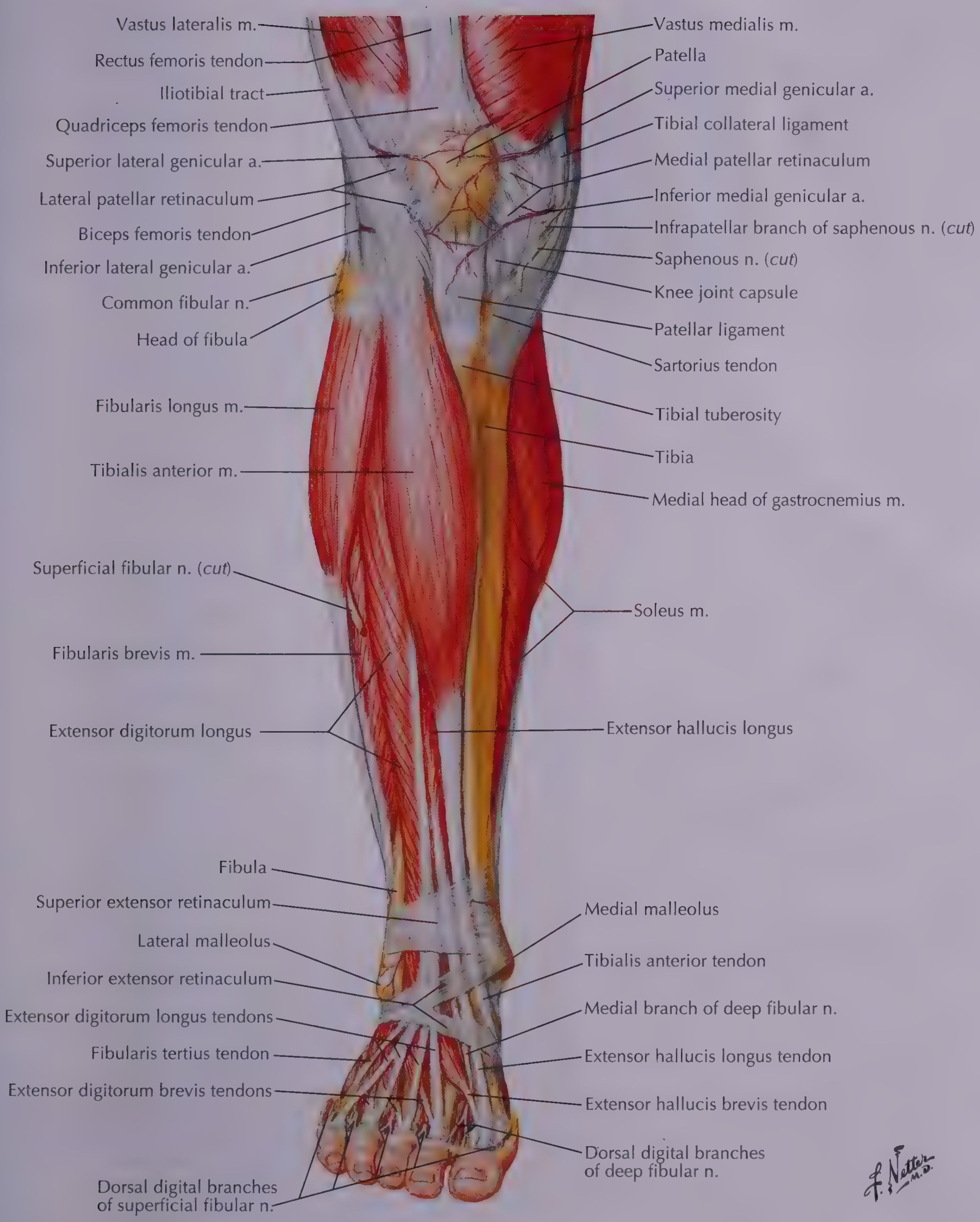
Muscles of Leg: Lateral Compartment

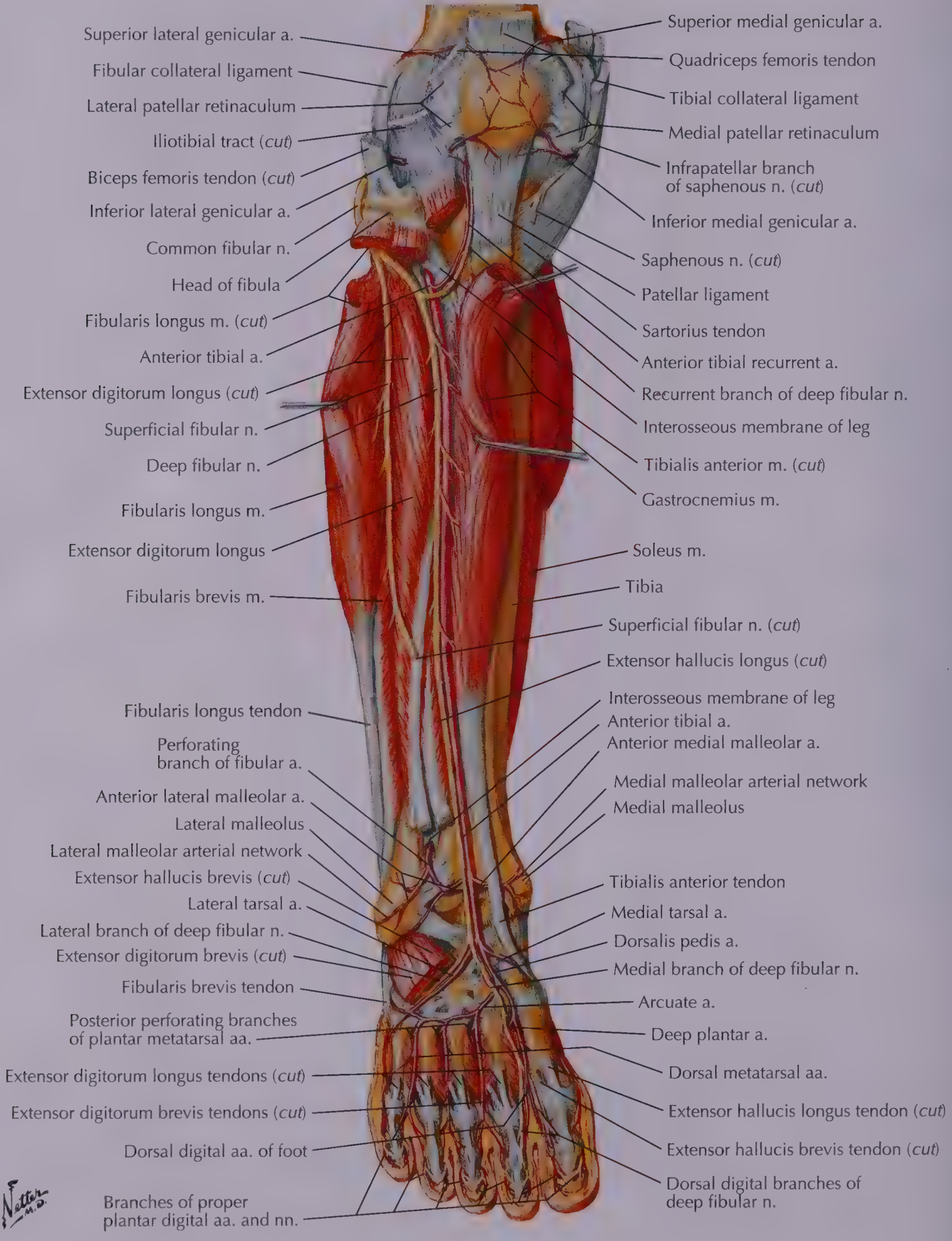
See also Plates 540, 554, BP 106


Biceps femoris m.
Long head
Short head
Tendon
Fibular collateral ligament
Common fibular n.
Inferior lateral genicular a.
Head of fibula
Lateral head of gastrocnemius m.
Soleus m.
Fibularis longus m. and tendon
Fibularis brevis m. and tendon
Fibula
Lateral malleolus
Calcaneal tendon (Achilles')
Subtendinous calcaneal bursa
Superior fibular retinaculum
Inferior fibular retinaculum
Fibularis longus tendon
Vastus lateralis m.
Iliotibial tract
Quadriceps femoris tendon
Superior lateral genicular a.
Patella
Lateral patellar retinaculum
Lateral condyle of tibia
Patellar ligament
Tibial tuberosity
Tibialis anterior m.
Extensor digitorum longus
Superficial fibular n. (*cut*)
Extensor digitorum longus tendon
Extensor hallucis longus and tendon
Superior extensor retinaculum
Inferior extensor retinaculum
Extensor digitorum brevis
Extensor hallucis longus tendon
Extensor digitorum longus tendons
Fibularis brevis tendon
Fibularis tertius tendon
5th metatarsal bone
F. Netter M.D.

See also Plates 554, BP 106

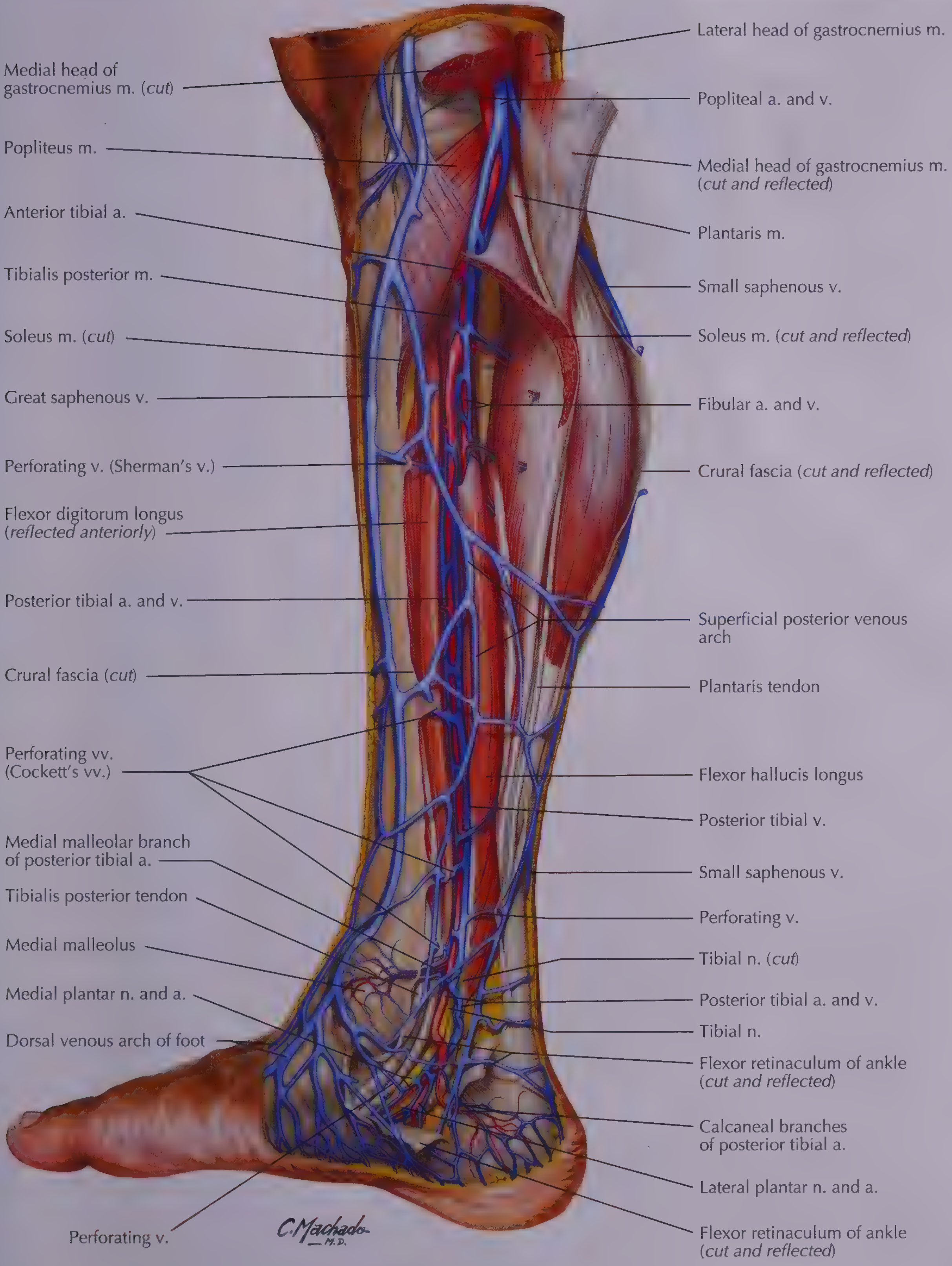

Vastus lateralis m.
Rectus femoris tendon
Iliotibial tract
Quadriceps femoris tendon
Superior lateral genicular a.
Lateral patellar retinaculum
Biceps femoris tendon
Inferior lateral genicular a.
Common fibular n.
Head of fibula
Fibularis longus m.
Tibialis anterior m.
Superficial fibular n. (*cut*)
Fibularis brevis m.
Extensor digitorum longus
Fibula
Superior extensor retinaculum
Lateral malleolus
Inferior extensor retinaculum
Extensor digitorum longus tendons
Fibularis tertius tendon
Extensor digitorum brevis tendons
Dorsal digital branches of superficial fibular n.
Vastus medialis m.
Patella
Superior medial genicular a.
Tibial collateral ligament
Medial patellar retinaculum
Inferior medial genicular a.
Infrapatellar branch of saphenous n. (*cut*)
Saphenous n. (*cut*)
Knee joint capsule
Patellar ligament
Sartorius tendon
Tibial tuberosity
Tibia
Medial head of gastrocnemius m.
Soleus m.
Extensor hallucis longus
Medial malleolus
Tibialis anterior tendon
Medial branch of deep fibular n.
Extensor hallucis longus tendon
Extensor hallucis brevis tendon
Dorsal digital branches of deep fibular n.
F. Netter M.D.

See also Plates 541, 554, BP 105, BP 106


Superior lateral genicular a.
Fibular collateral ligament
Lateral patellar retinaculum
Iliotibial tract (*cut*)
Biceps femoris tendon (*cut*)
Inferior lateral genicular a.
Common fibular n.
Head of fibula
Fibularis longus m. (*cut*)
Anterior tibial a.
Extensor digitorum longus (*cut*)
Superficial fibular n.
Deep fibular n.
Fibularis longus m.
Extensor digitorum longus
Fibularis brevis m.
Fibularis longus tendon
Perforating branch of fibular a.
Anterior lateral malleolar a.
Lateral malleolus
Lateral malleolar arterial network
Extensor hallucis brevis (*cut*)
Lateral tarsal a.
Lateral branch of deep fibular n.
Extensor digitorum brevis (*cut*)
Fibularis brevis tendon
Posterior perforating branches of plantar metatarsal aa.
Extensor digitorum longus tendons (*cut*)
Extensor digitorum brevis tendons (*cut*)
Dorsal digital aa. of foot
Branches of proper plantar digital aa. and nn.
Superior medial genicular a.
Quadriceps femoris tendon
Tibial collateral ligament
Medial patellar retinaculum
Infrapatellar branch of saphenous n. (*cut*)
Inferior medial genicular a.
Saphenous n. (*cut*)
Patellar ligament
Sartorius tendon
Anterior tibial recurrent a.
Recurrent branch of deep fibular n.
Interosseous membrane of leg
Tibialis anterior m. (*cut*)
Gastrocnemius m.
Soleus m.
Tibia
Superficial fibular n. (*cut*)
Extensor hallucis longus (*cut*)
Interosseous membrane of leg
Anterior tibial a.
Anterior medial malleolar a.
Medial malleolar arterial network
Medial malleolus
Tibialis anterior tendon
Medial tarsal a.
Dorsalis pedis a.
Medial branch of deep fibular n.
Arcuate a.
Deep plantar a.
Dorsal metatarsal aa.
Extensor hallucis longus tendon (*cut*)
Extensor hallucis brevis tendon (*cut*)
Dorsal digital branches of deep fibular n.
F. Netter M.D.

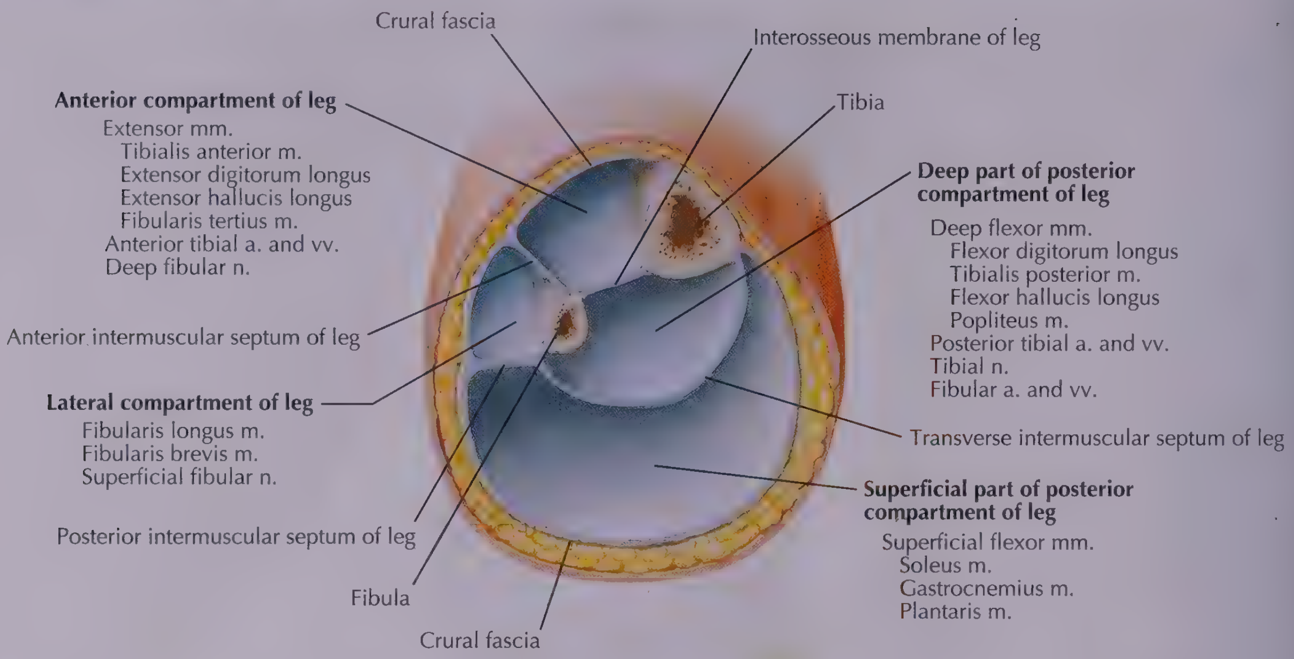
Veins of Leg

See also Plates 492, 493, 523

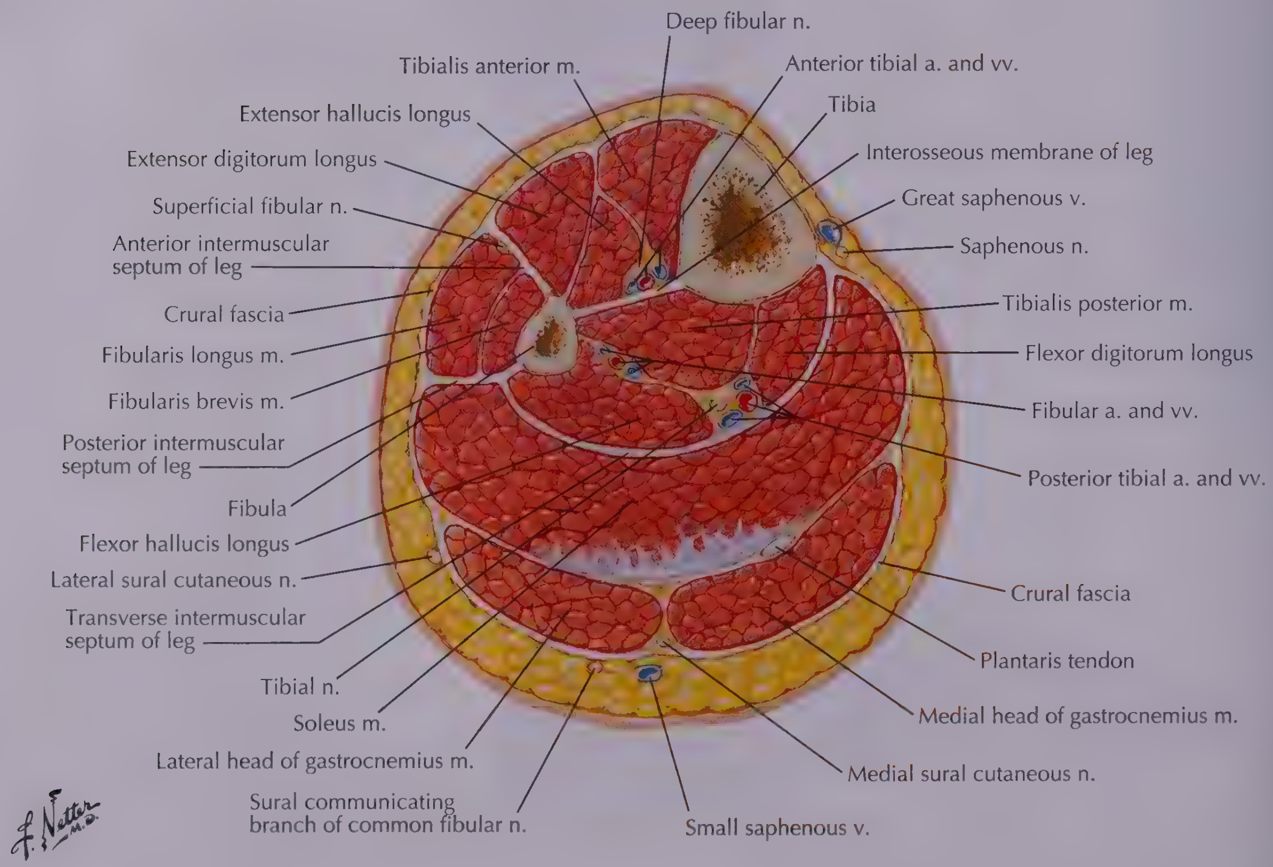

Medial head of gastrocnemius m. (*cut*)
Popliteus m.
Anterior tibial a.
Tibialis posterior m.
Soleus m. (*cut*)
Great saphenous v.
Perforating v. (Sherman's v.)
Flexor digitorum longus (*reflected anteriorly*)
Posterior tibial a. and v.
Crural fascia (*cut*)
Perforating vv. (Cockett's vv.)
Medial malleolar branch of posterior tibial a.
Tibialis posterior tendon
Medial malleolus
Medial plantar n. and a.
Dorsal venous arch of foot
Perforating v.
C. Machado M.D.
Lateral head of gastrocnemius m.
Popliteal a. and v.
Medial head of gastrocnemius m. (*cut and reflected*)
Plantaris m.
Small saphenous v.
Soleus m. (*cut and reflected*)
Fibular a. and v.
Crural fascia (*cut and reflected*)
Superficial posterior venous arch
Plantaris tendon
Flexor hallucis longus
Posterior tibial v.
Small saphenous v.
Perforating v.
Tibial n. (*cut*)
Posterior tibial a. and v.
Tibial n.
Flexor retinaculum of ankle (*cut and reflected*)
Calcaneal branches of posterior tibial a.
Lateral plantar n. and a.
Flexor retinaculum of ankle (*cut and reflected*)

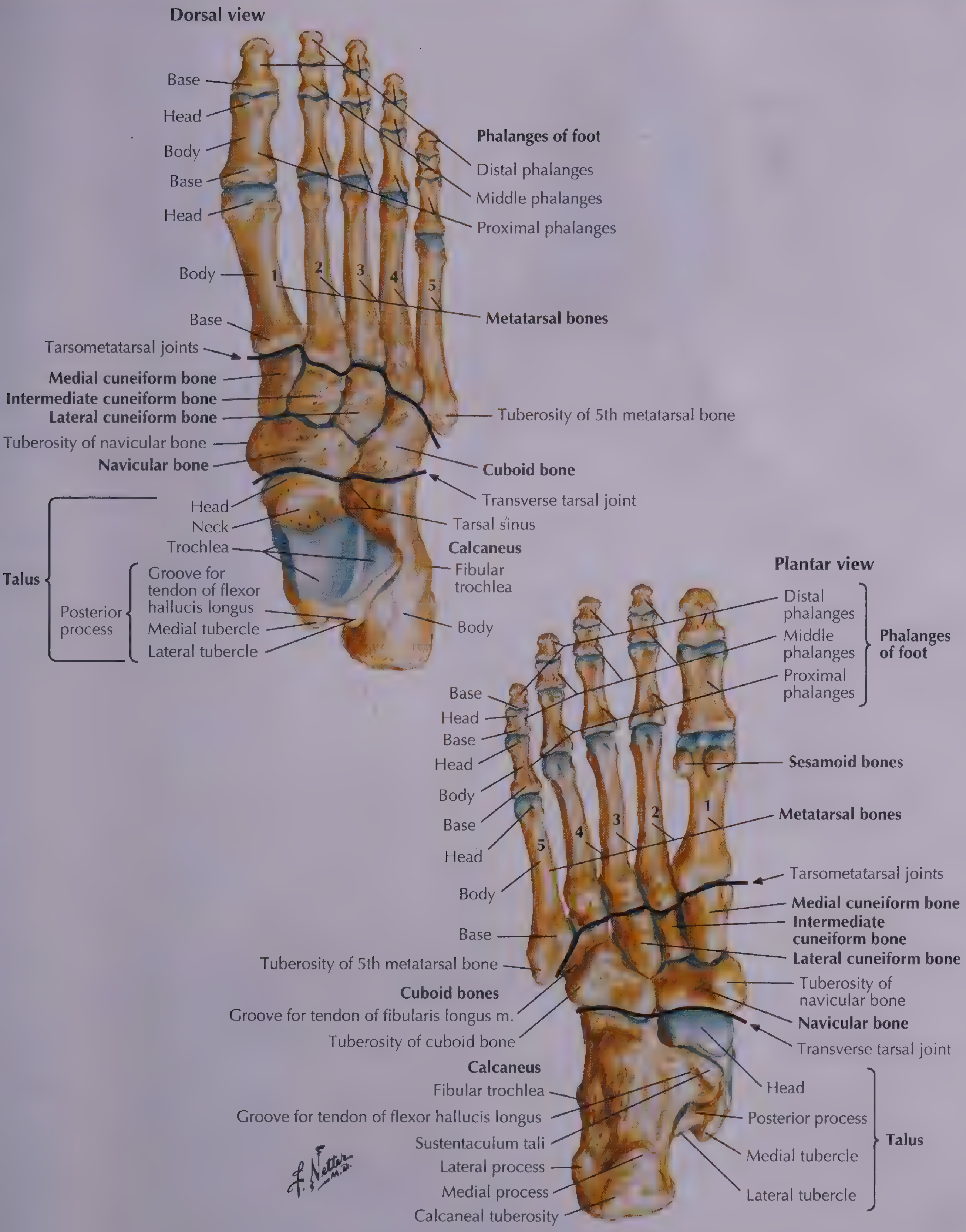
Leg: Cross Sections and Compartments

See also Plate BP 106


Crural fascia
Interosseous membrane of leg
Anterior compartment of leg
Extensor mm.
Tibialis anterior m.
Extensor digitorum longus
Extensor hallucis longus
Fibularis tertius m.
Anterior tibial a. and vv.
Deep fibular n.
Tibia
Deep part of posterior compartment of leg
Deep flexor mm.
Flexor digitorum longus
Tibialis posterior m.
Flexor hallucis longus
Popliteus m.
Posterior tibial a. and vv.
Tibial n.
Fibular a. and vv.
Anterior intermuscular septum of leg
Lateral compartment of leg
Fibularis longus m.
Fibularis brevis m.
Superficial fibular n.
Transverse intermuscular septum of leg
Superficial part of posterior compartment of leg
Superficial flexor mm.
Soleus m.
Gastrocnemius m.
Plantaris m.
Posterior intermuscular septum of leg
Fibula
Crural fascia

Cross section just above middle of leg

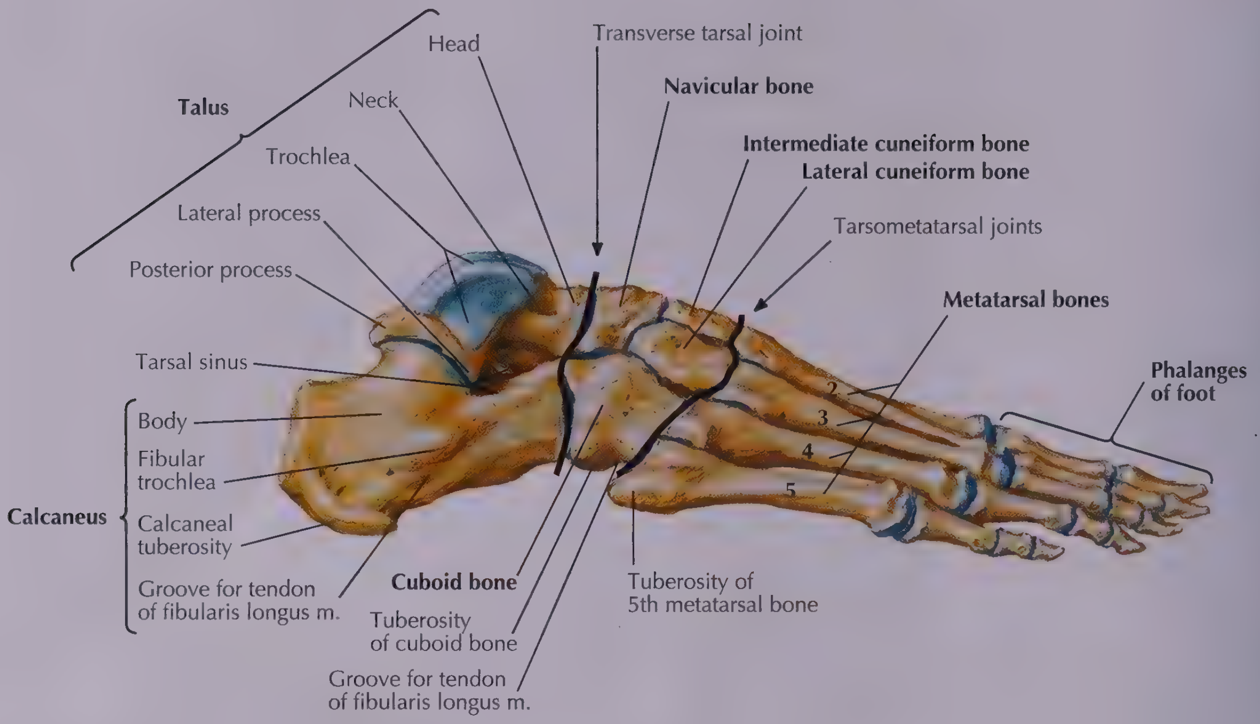

Deep fibular n.
Tibialis anterior m.
Anterior tibial a. and vv.
Extensor hallucis longus
Tibia
Extensor digitorum longus
Interosseous membrane of leg
Great saphenous v.
Superficial fibular n.
Saphenous n.
Anterior intermuscular septum of leg
Tibialis posterior m.
Crural fascia
Flexor digitorum longus
Fibularis longus m.
Fibular a. and vv.
Fibularis brevis m.
Posterior intermuscular septum of leg
Posterior tibial a. and vv.
Fibula
Flexor hallucis longus
Lateral sural cutaneous n.
Crural fascia
Transverse intermuscular septum of leg
Plantaris tendon
Tibial n.
Medial head of gastrocnemius m.
Soleus m.
Medial sural cutaneous n.
Lateral head of gastrocnemius m.
Sural communicating branch of common fibular n.
Small saphenous v.
F. Netter M.D.


Dorsal view
Base
Head
Body
Base
Head
Body
Base
Tarsometatarsal joints
Medial cuneiform bone
Intermediate cuneiform bone
Lateral cuneiform bone
Tuberosity of navicular bone
Navicular bone
Talus
Head
Neck
Trochlea
Posterior process
Groove for tendon of flexor hallucis longus
Medial tubercle
Lateral tubercle
Phalanges of foot
Distal phalanges
Middle phalanges
Proximal phalanges
1
2
3
4
5
Metatarsal bones
Tuberosity of 5th metatarsal bone
Cuboid bone
Transverse tarsal joint
Tarsal sinus
Calcaneus
Fibular trochlea
Body
Plantar view
Distal phalanges
Middle phalanges
Proximal phalanges
Phalanges of foot
Sesamoid bones
Metatarsal bones
Tarsometatarsal joints
Medial cuneiform bone
Intermediate cuneiform bone
Lateral cuneiform bone
Tuberosity of navicular bone
Navicular bone
Transverse tarsal joint
Head
Posterior process
Medial tubercle
Lateral tubercle
Talus
Base
Head
Base
Head
Body
Base
Head
Body
Base
Tuberosity of 5th metatarsal bone
Cuboid bones
Groove for tendon of fibularis longus m.
Tuberosity of cuboid bone
Calcaneus
Fibular trochlea
Groove for tendon of flexor hallucis longus
Sustentaculum tali
Lateral process
Medial process
Calcaneal tuberosity
5
4
3
2
1

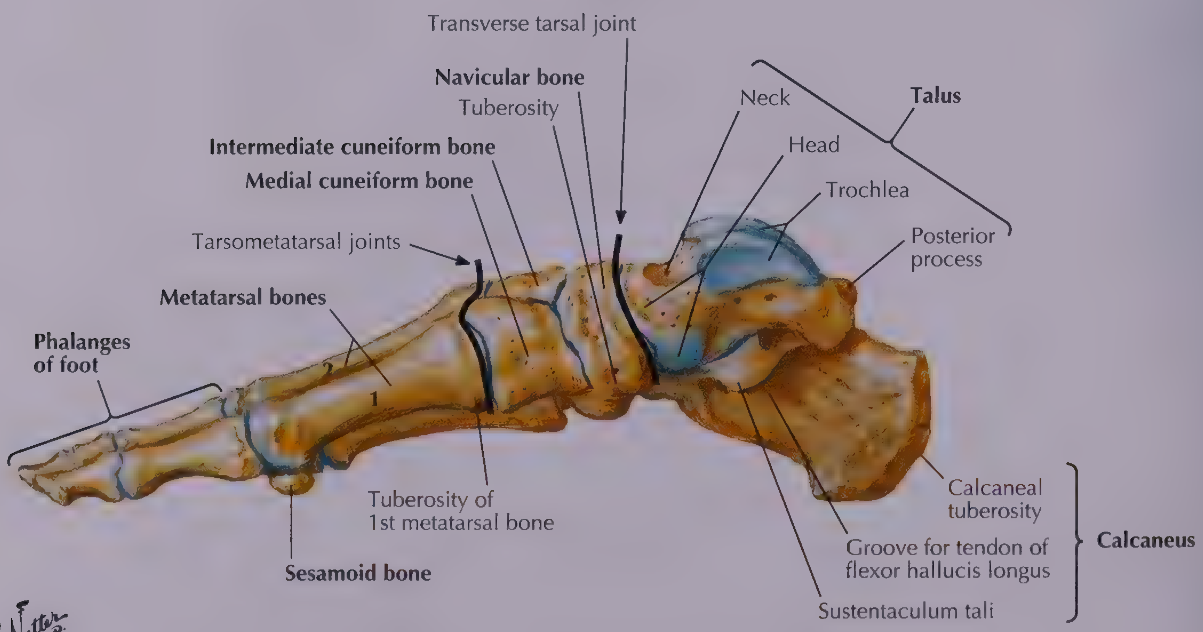
Bones of Foot: Lateral View

See also Plate 556

Lateral view

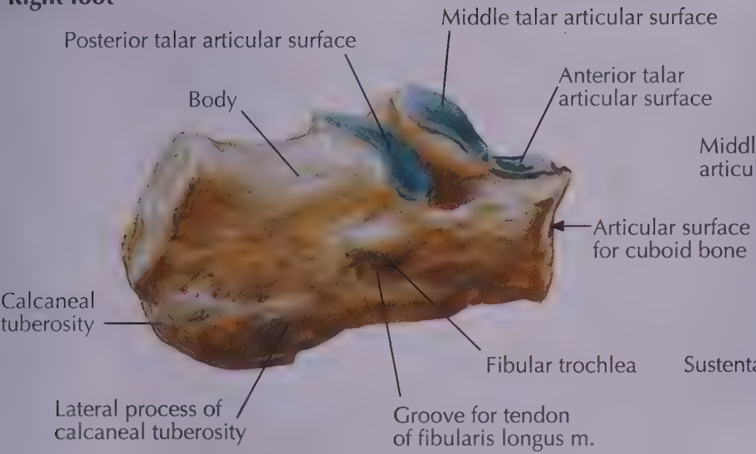

Talus
Head
Neck
Trochlea
Lateral process
Posterior process
Transverse tarsal joint
Navicular bone
Intermediate cuneiform bone
Lateral cuneiform bone
Tarsometatarsal joints
Metatarsal bones
2
3
4
5
Phalanges of foot
Tarsal sinus
Calcaneus
Body
Fibular trochlea
Calcaneal tuberosity
Groove for tendon of fibularis longus m.
Cuboid bone
Tuberosity of cuboid bone
Groove for tendon of fibularis longus m.
Tuberosity of 5th metatarsal bone

Medial view

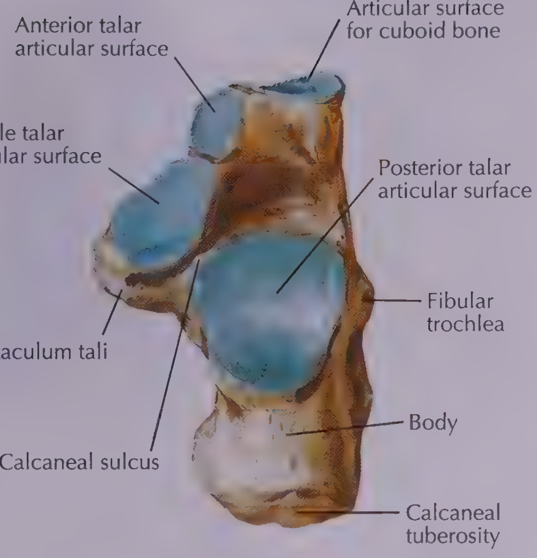

Transverse tarsal joint
Navicular bone
Tuberosity
Intermediate cuneiform bone
Medial cuneiform bone
Tarsometatarsal joints
Metatarsal bones
2
1
Phalanges of foot
Neck
Talus
Head
Trochlea
Posterior process
Calcaneal tuberosity
Groove for tendon of flexor hallucis longus
Sustentaculum tali
Calcaneus
Tuberosity of 1st metatarsal bone
Sesamoid bone

See also Plate 556

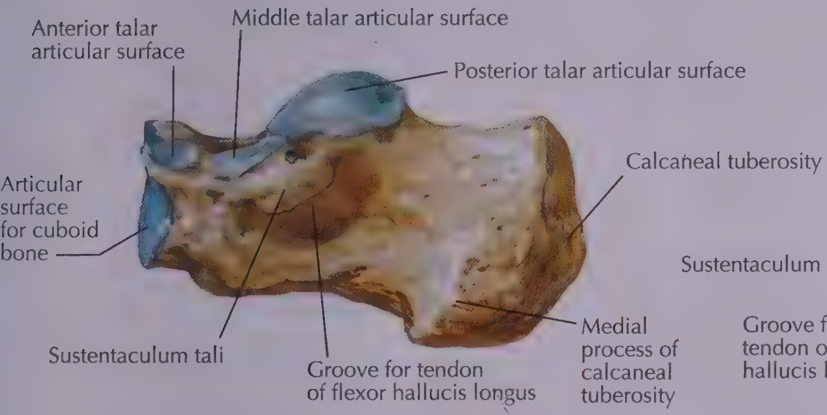
Right foot


Middle talar articular surface
Posterior talar articular surface
Body
Anterior talar articular surface
Articular surface for cuboid bone
Calcaneal tuberosity
Fibular trochlea
Lateral process of calcaneal tuberosity
Groove for tendon of fibularis longus m.

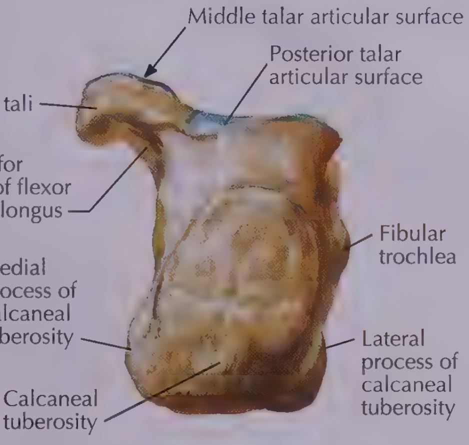
Lateral view


Anterior talar articular surface
Articular surface for cuboid bone
Middle talar articular surface
Posterior talar articular surface
Fibular trochlea
Sustentaculum tali
Body
Calcaneal sulcus
Calcaneal tuberosity

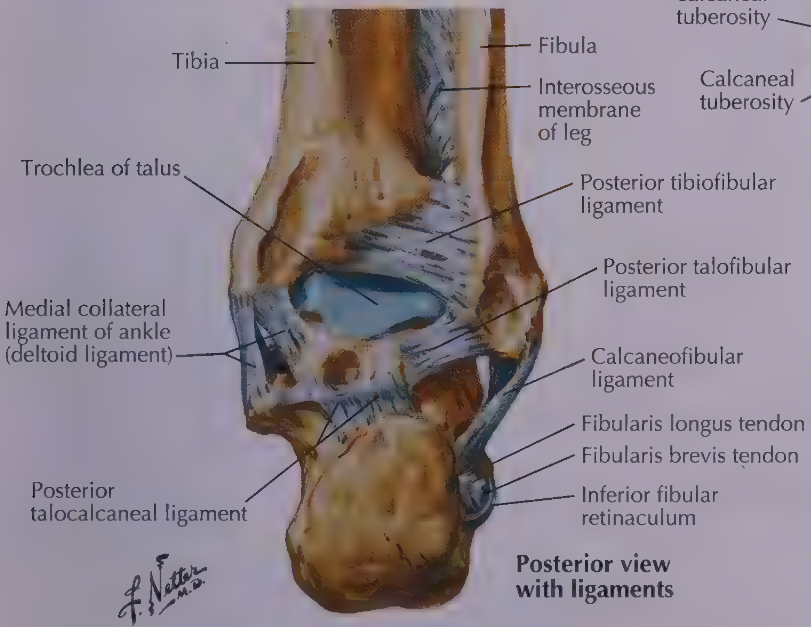
Superior view


Anterior talar articular surface
Middle talar articular surface
Posterior talar articular surface
Calcaneal tuberosity
Articular surface for cuboid bone
Sustentaculum tali
Groove for tendon of flexor hallucis longus
Medial process of calcaneal tuberosity

Medial view


Middle talar articular surface
Posterior talar articular surface
Sustentaculum tali
Groove for tendon of flexor hallucis longus
Fibular trochlea
Medial process of calcaneal tuberosity
Lateral process of calcaneal tuberosity
Calcaneal tuberosity

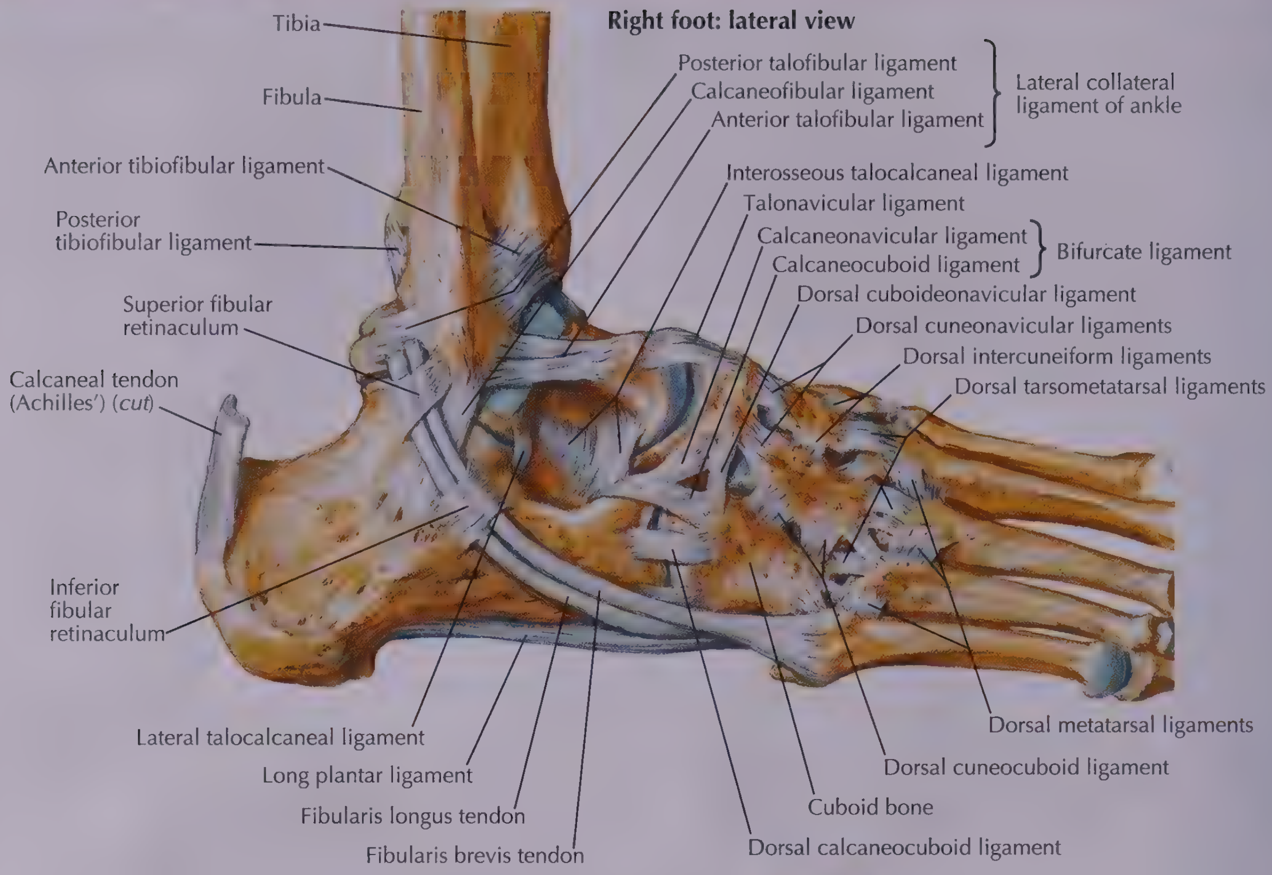
Posterior view

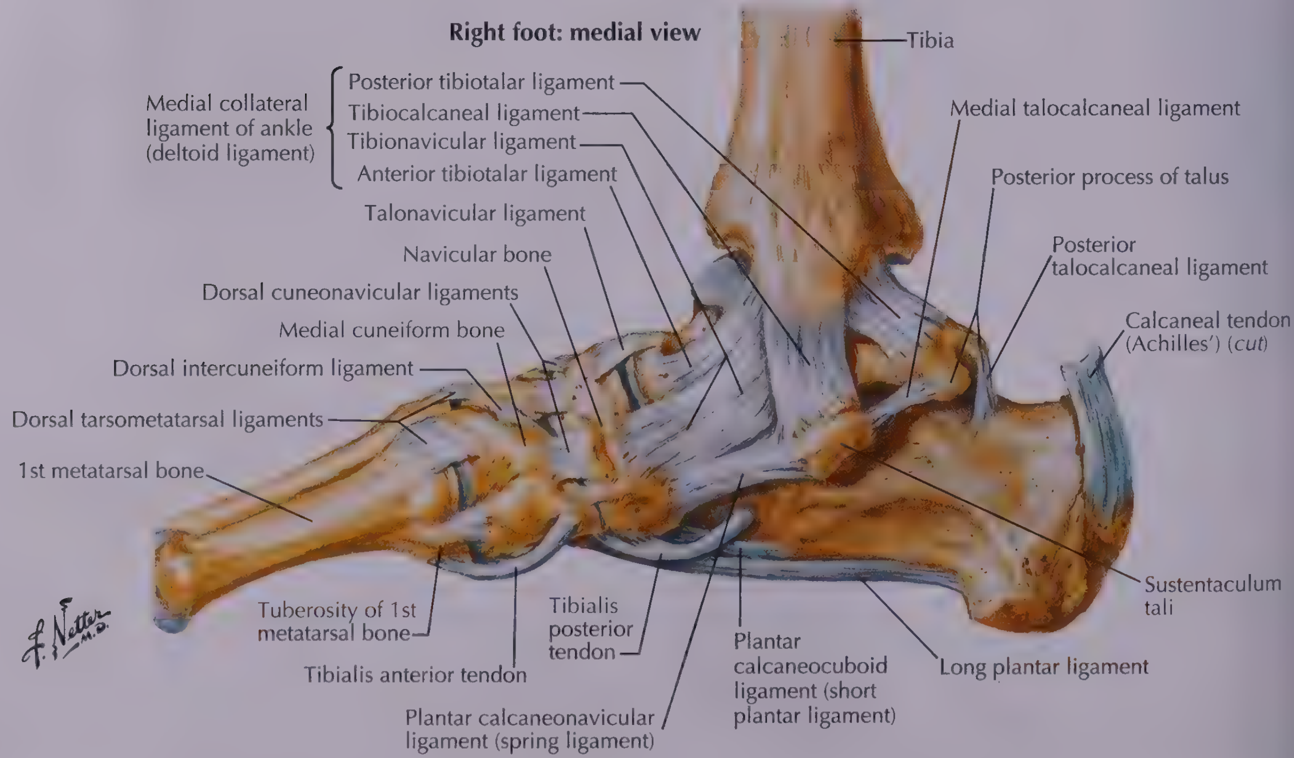

Tibia
Fibula
Interosseous membrane of leg
Trochlea of talus
Posterior tibiofibular ligament
Posterior talofibular ligament
Medial collateral ligament of ankle (deltoid ligament)
Calcaneofibular ligament
Fibularis longus tendon
Fibularis brevis tendon
Inferior fibular retinaculum
Posterior talocalcaneal ligament
F. Netter M.D.

Posterior view with ligaments

Ligaments of Ankle and Foot

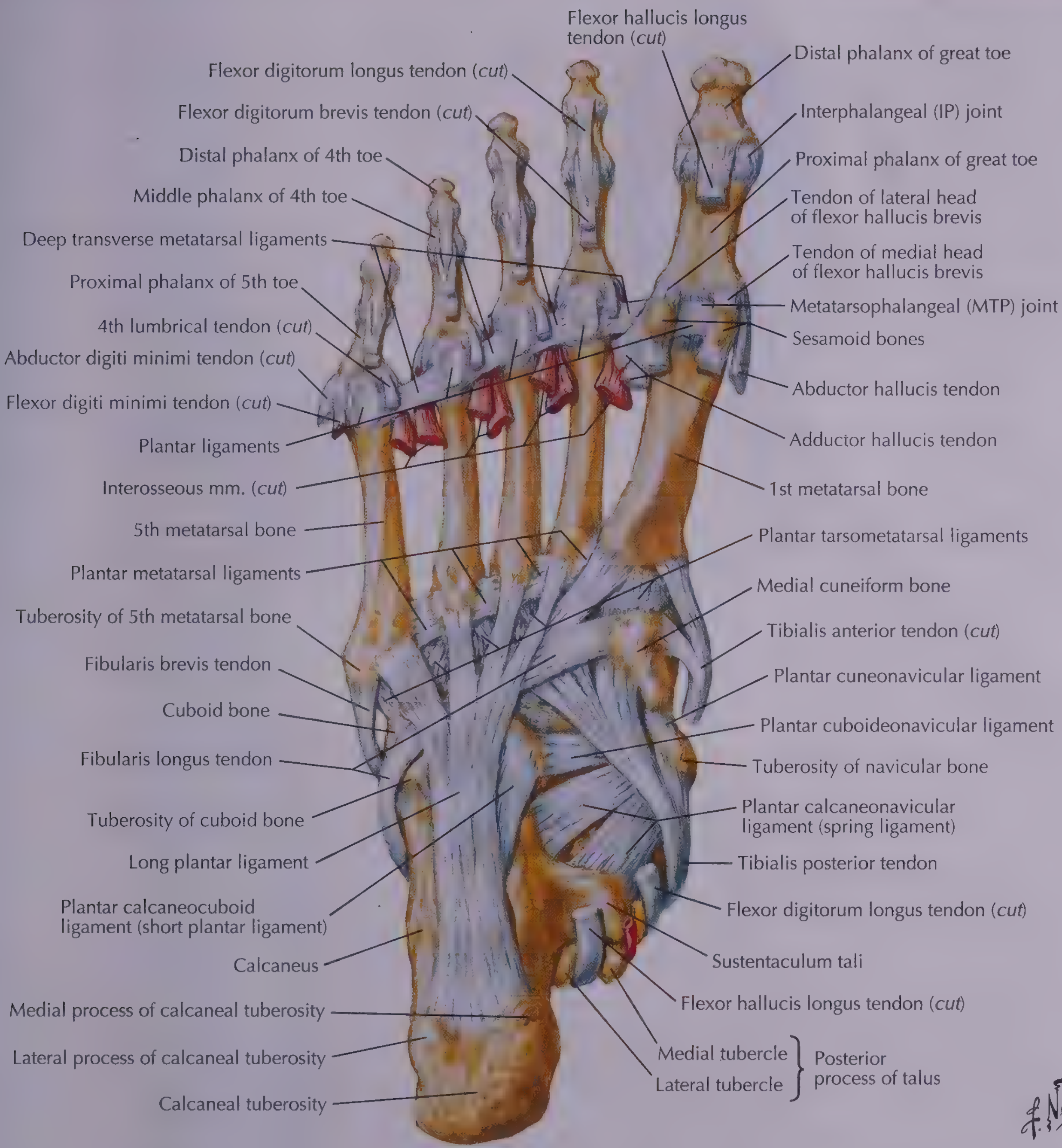
See also Plate 556

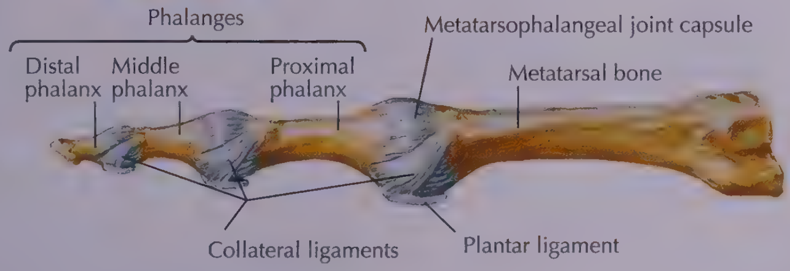

Right foot: lateral view
Tibia
Fibula
Anterior tibiofibular ligament
Posterior tibiofibular ligament
Superior fibular retinaculum
Calcaneal tendon (Achilles') (*cut*)
Inferior fibular retinaculum
Posterior talofibular ligament
Calcaneofibular ligament
Anterior talofibular ligament
Lateral collateral ligament of ankle
Interosseous talocalcaneal ligament
Talonavicular ligament
Calcaneonavicular ligament
Calcaneocuboid ligament
Bifurcate ligament
Dorsal cuboideonavicular ligament
Dorsal cuneonavicular ligaments
Dorsal intercuneiform ligaments
Dorsal tarsometatarsal ligaments
Lateral talocalcaneal ligament
Long plantar ligament
Fibularis longus tendon
Fibularis brevis tendon
Dorsal metatarsal ligaments
Dorsal cuneocuboid ligament
Cuboid bone
Dorsal calcaneocuboid ligament


Right foot: medial view
Tibia
Medial collateral ligament of ankle (deltoid ligament)
Posterior tibiotalar ligament
Tibiocalcaneal ligament
Tibionavicular ligament
Anterior tibiotalar ligament
Talonavicular ligament
Navicular bone
Dorsal cuneonavicular ligaments
Medial cuneiform bone
Dorsal intercuneiform ligament
Dorsal tarsometatarsal ligaments
1st metatarsal bone
Medial talocalcaneal ligament
Posterior process of talus
Posterior talocalcaneal ligament
Calcaneal tendon (Achilles') (*cut*)
Sustentaculum tali
Long plantar ligament
Plantar calcaneocuboid ligament (short plantar ligament)
Plantar calcaneonavicular ligament (spring ligament)
Tibialis posterior tendon
Tibialis anterior tendon
Tuberosity of 1st metatarsal bone
F. Netter M.D.

Ligaments of Foot: Plantar View

See also Plates 546, 547

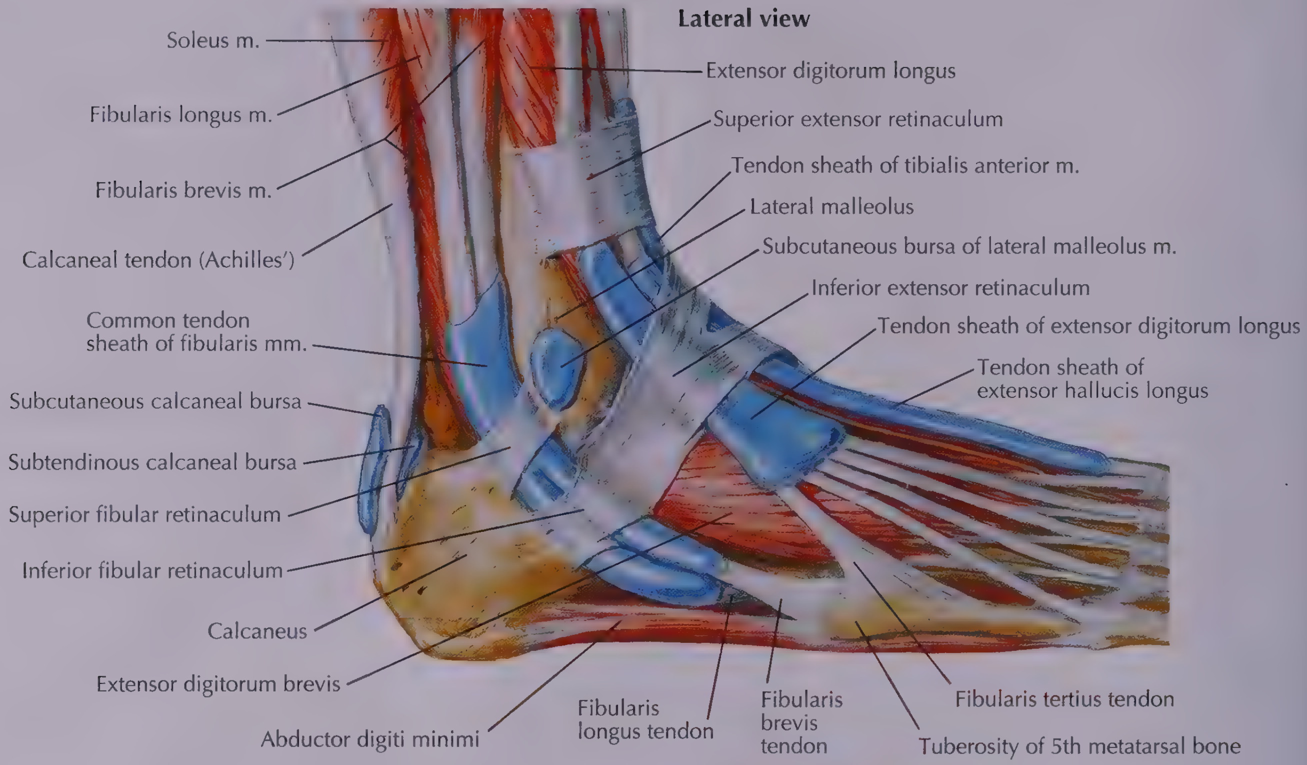

Flexor hallucis longus tendon (*cut*)
Distal phalanx of great toe
Interphalangeal (IP) joint
Proximal phalanx of great toe
Tendon of lateral head of flexor hallucis brevis
Tendon of medial head of flexor hallucis brevis
Metatarsophalangeal (MTP) joint
Sesamoid bones
Abductor hallucis tendon
Adductor hallucis tendon
1st metatarsal bone
Plantar tarsometatarsal ligaments
Medial cuneiform bone
Tibialis anterior tendon (*cut*)
Plantar cuneonavicular ligament
Plantar cuboideonavicular ligament
Tuberosity of navicular bone
Plantar calcaneonavicular ligament (spring ligament)
Tibialis posterior tendon
Flexor digitorum longus tendon (*cut*)
Sustentaculum tali
Flexor hallucis longus tendon (*cut*)
Medial tubercle
Lateral tubercle
Posterior process of talus
Flexor digitorum longus tendon (*cut*)
Flexor digitorum brevis tendon (*cut*)
Distal phalanx of 4th toe
Middle phalanx of 4th toe
Deep transverse metatarsal ligaments
Proximal phalanx of 5th toe
4th lumbrical tendon (*cut*)
Abductor digiti minimi tendon (*cut*)
Flexor digiti minimi tendon (*cut*)
Plantar ligaments
Interosseous mm. (*cut*)
5th metatarsal bone
Plantar metatarsal ligaments
Tuberosity of 5th metatarsal bone
Fibularis brevis tendon
Cuboid bone
Fibularis longus tendon
Tuberosity of cuboid bone
Long plantar ligament
Plantar calcaneocuboid ligament (short plantar ligament)
Calcaneus
Medial process of calcaneal tuberosity
Lateral process of calcaneal tuberosity
Calcaneal tuberosity


Phalanges
Distal phalanx
Middle phalanx
Proximal phalanx
Metatarsophalangeal joint capsule
Metatarsal bone
Collateral ligaments
Plantar ligament

Capsules and ligaments of metatarsophalangeal and interphalangeal joints: lateral view

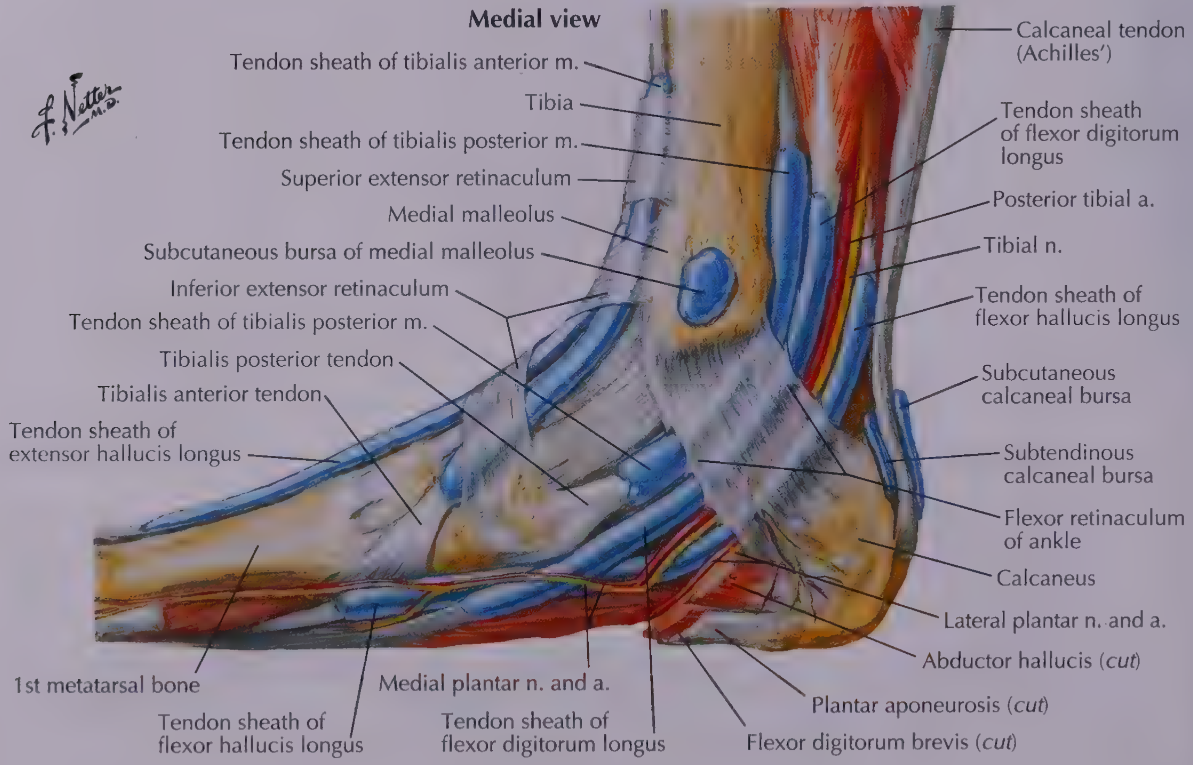
Tendon Sheaths of Ankle

See also Plate 530



Lateral view

Soleus m.
Extensor digitorum longus
Fibularis longus m.
Superior extensor retinaculum
Fibularis brevis m.
Tendon sheath of tibialis anterior m.
Lateral malleolus
Calcaneal tendon (Achilles')
Subcutaneous bursa of lateral malleolus m.
Inferior extensor retinaculum
Common tendon sheath of fibularis mm.
Tendon sheath of extensor digitorum longus
Tendon sheath of extensor hallucis longus
Subcutaneous calcaneal bursa
Subtendinous calcaneal bursa
Superior fibular retinaculum
Inferior fibular retinaculum
Calcaneus
Extensor digitorum brevis
Fibularis longus tendon
Fibularis brevis tendon
Fibularis tertius tendon
Abductor digiti minimi
Tuberosity of 5th metatarsal bone

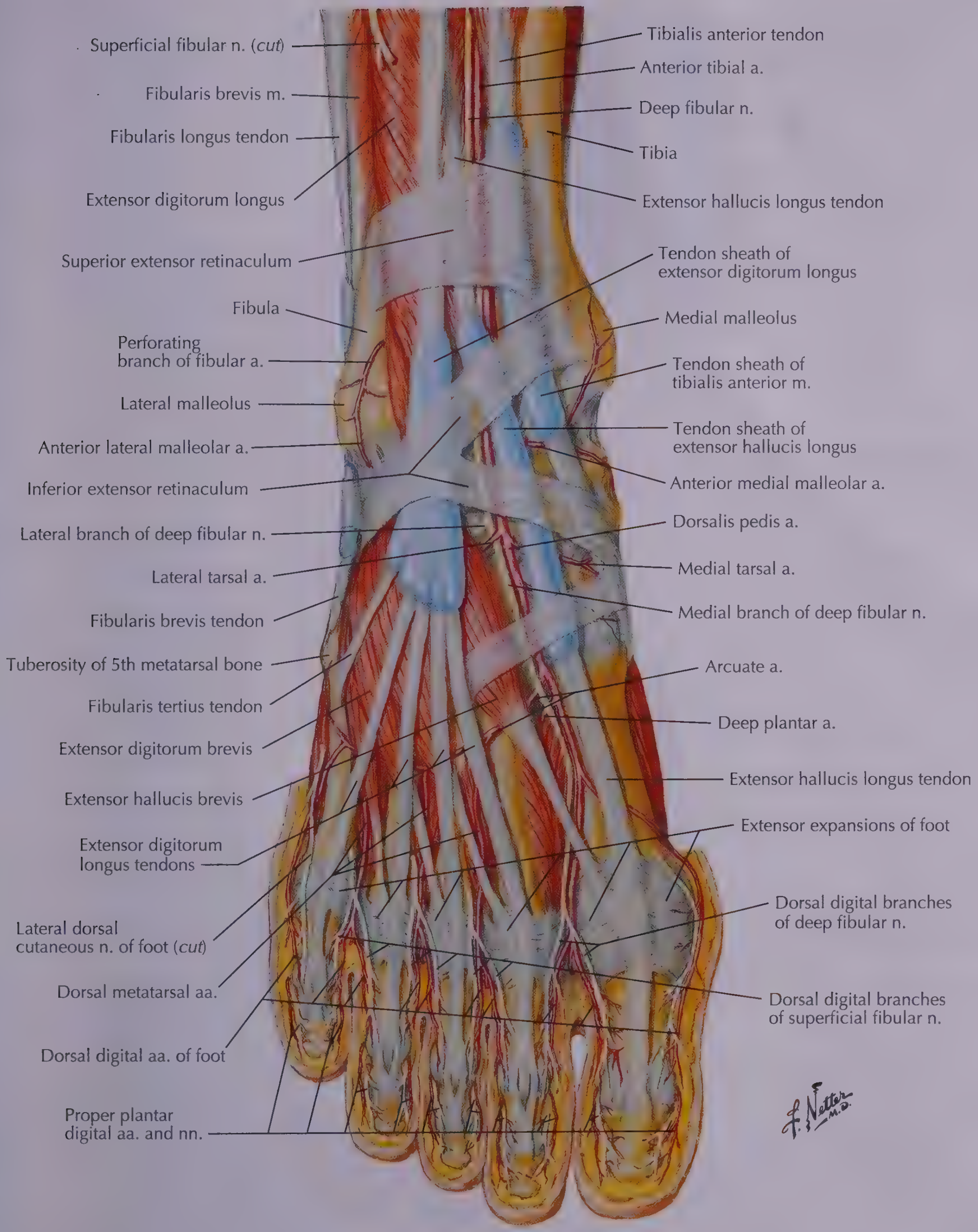


Medial view

Tendon sheath of tibialis anterior m.
Calcaneal tendon (Achilles')
Tibia
Tendon sheath of flexor digitorum longus
Tendon sheath of tibialis posterior m.
Superior extensor retinaculum
Posterior tibial a.
Medial malleolus
Tibial n.
Subcutaneous bursa of medial malleolus
Inferior extensor retinaculum
Tendon sheath of flexor hallucis longus
Tendon sheath of tibialis posterior m.
Tibialis posterior tendon
Subcutaneous calcaneal bursa
Tibialis anterior tendon
Tendon sheath of extensor hallucis longus
Subtendinous calcaneal bursa
Flexor retinaculum of ankle
Calcaneus
Lateral plantar n. and a.
Abductor hallucis (*cut*)
1st metatarsal bone
Medial plantar n. and a.
Plantar aponeurosis (*cut*)
Tendon sheath of flexor hallucis longus
Tendon sheath of flexor digitorum longus
Flexor digitorum brevis (*cut*)

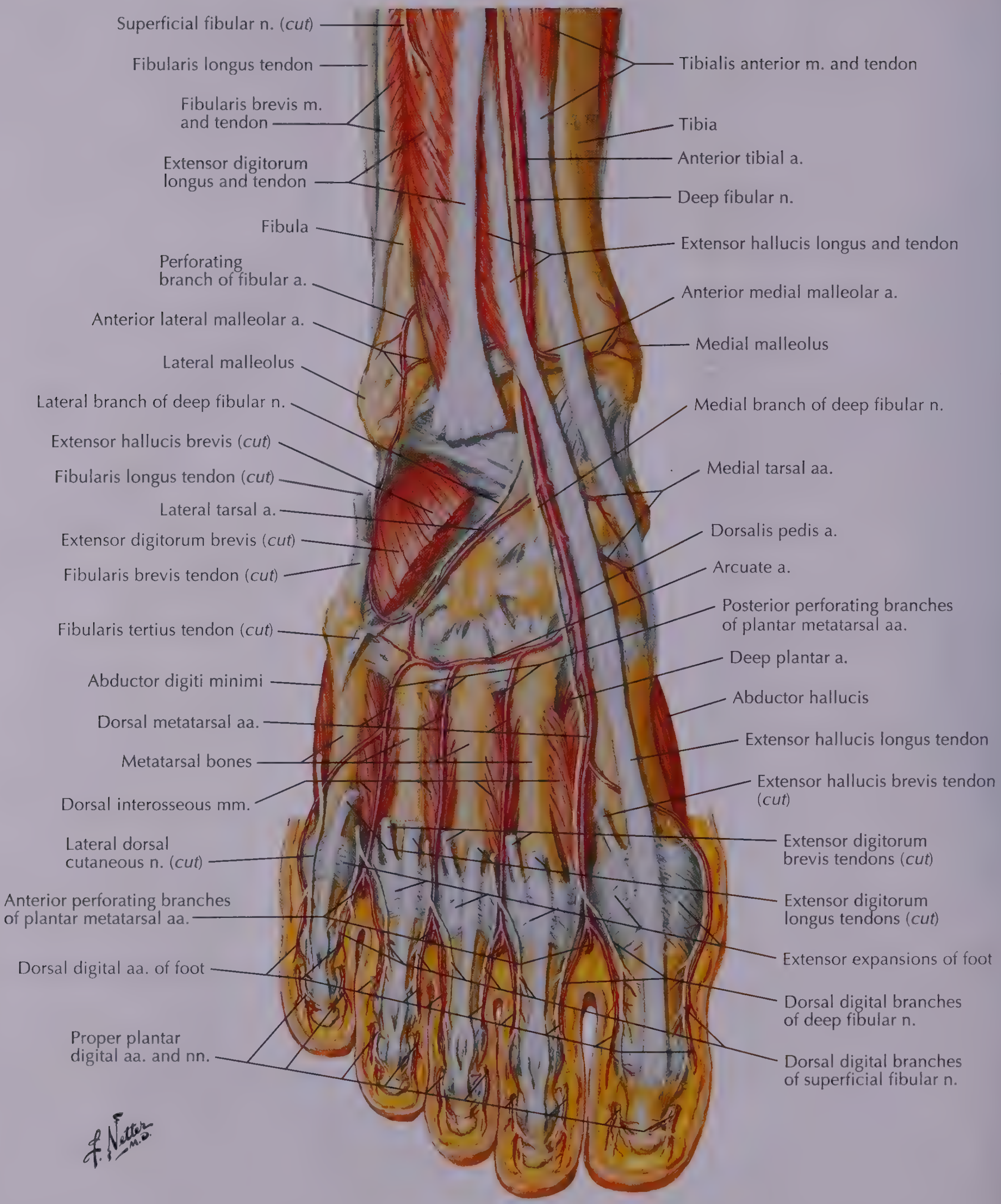
Muscles of Dorsum of Foot: Superficial Dissection

See also Plates 554, BP 109

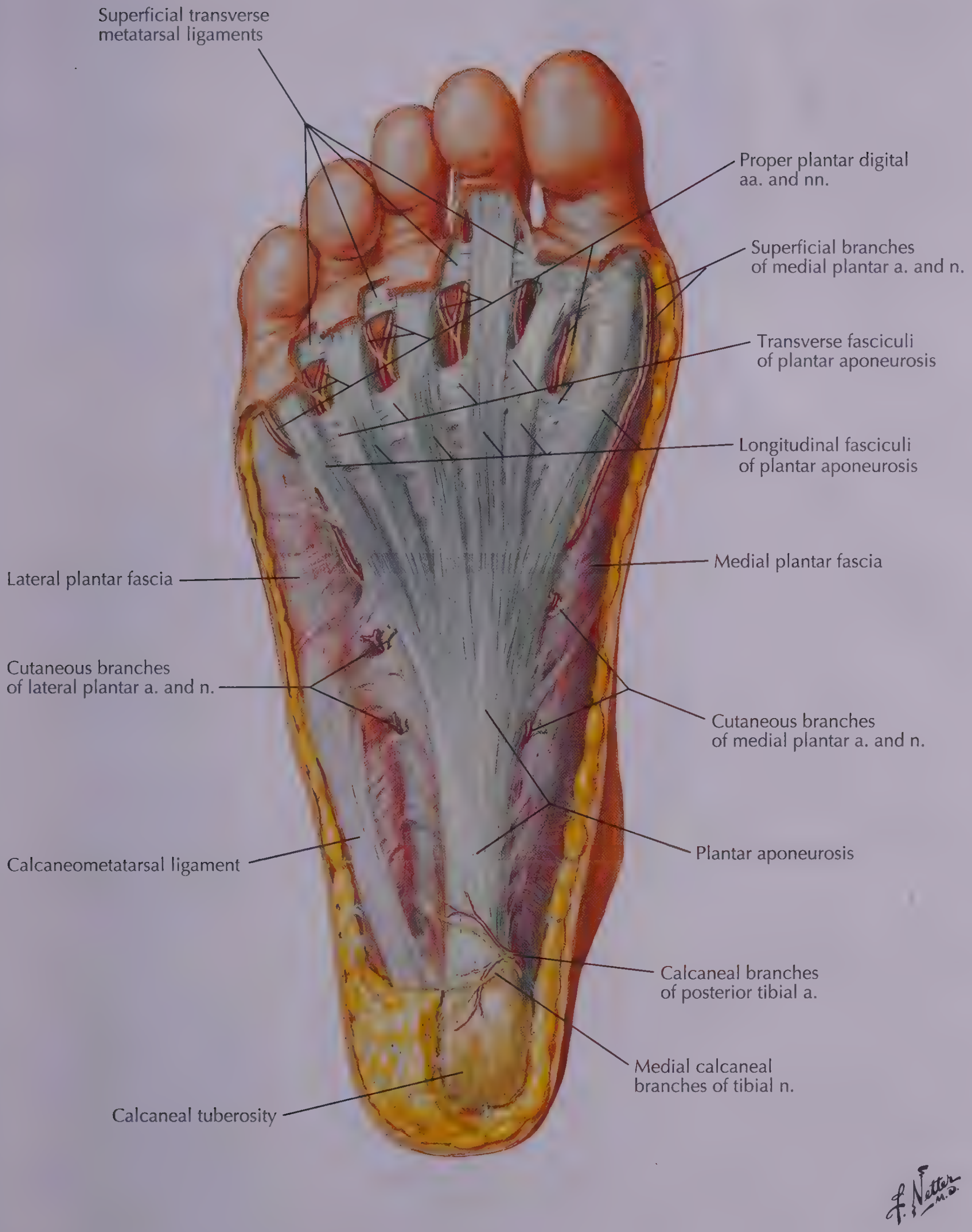

Superficial fibular n. (*cut*)
Fibularis brevis m.
Fibularis longus tendon
Extensor digitorum longus
Superior extensor retinaculum
Fibula
Perforating branch of fibular a.
Lateral malleolus
Anterior lateral malleolar a.
Inferior extensor retinaculum
Lateral branch of deep fibular n.
Lateral tarsal a.
Fibularis brevis tendon
Tuberosity of 5th metatarsal bone
Fibularis tertius tendon
Extensor digitorum brevis
Extensor hallucis brevis
Extensor digitorum longus tendons
Lateral dorsal cutaneous n. of foot (*cut*)
Dorsal metatarsal aa.
Dorsal digital aa. of foot
Proper plantar digital aa. and nn.
Tibialis anterior tendon
Anterior tibial a.
Deep fibular n.
Tibia
Extensor hallucis longus tendon
Tendon sheath of extensor digitorum longus
Medial malleolus
Tendon sheath of tibialis anterior m.
Tendon sheath of extensor hallucis longus
Anterior medial malleolar a.
Dorsalis pedis a.
Medial tarsal a.
Medial branch of deep fibular n.
Arcuate a.
Deep plantar a.
Extensor hallucis longus tendon
Extensor expansions of foot
Dorsal digital branches of deep fibular n.
Dorsal digital branches of superficial fibular n.
F. Netter M.D.

Muscles of Dorsum of Foot: Deep Dissection

See also Plates 547, BP 109

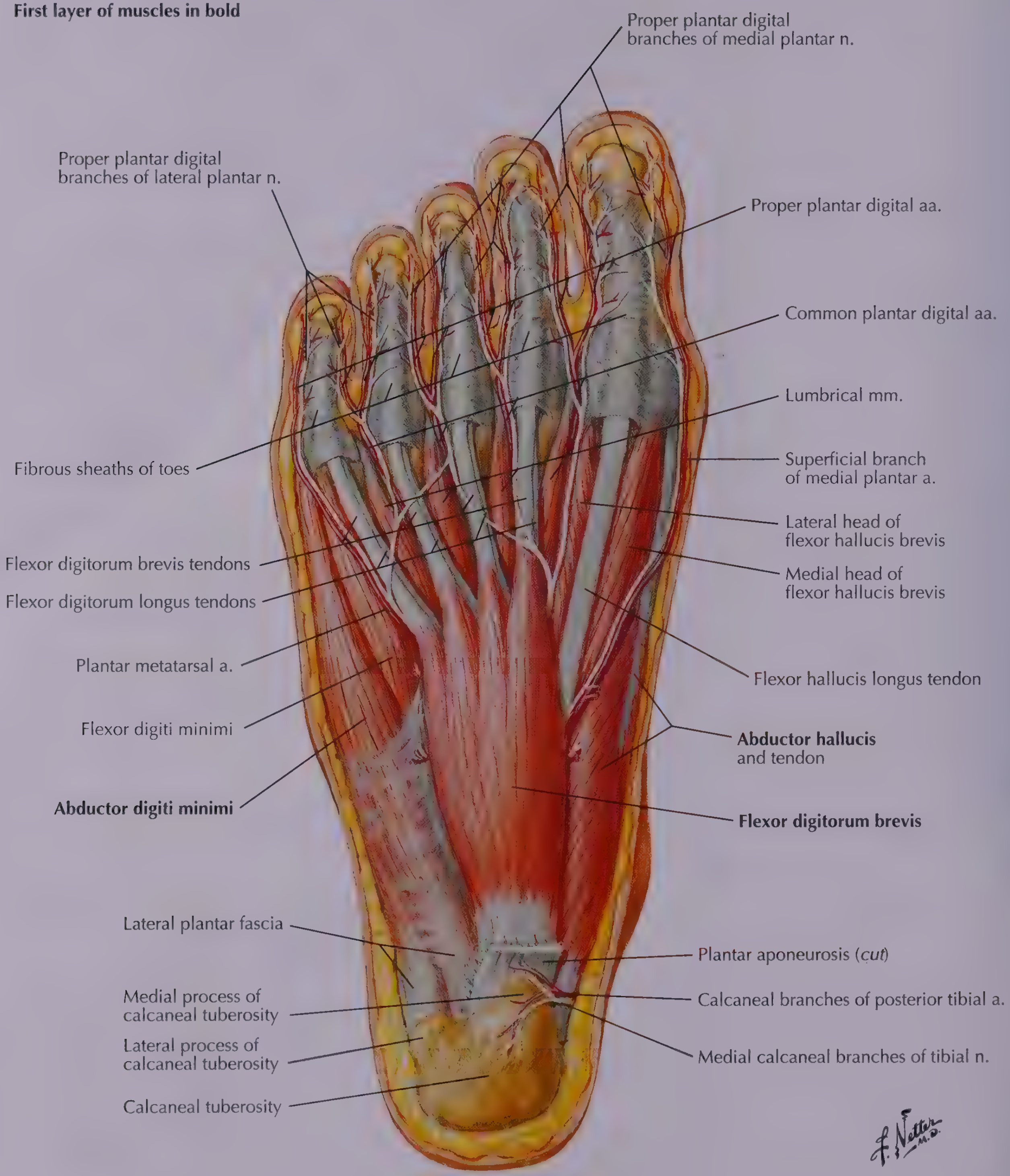

Superficial fibular n. (*cut*)
Fibularis longus tendon
Fibularis brevis m. and tendon
Extensor digitorum longus and tendon
Fibula
Perforating branch of fibular a.
Anterior lateral malleolar a.
Lateral malleolus
Lateral branch of deep fibular n.
Extensor hallucis brevis (*cut*)
Fibularis longus tendon (*cut*)
Lateral tarsal a.
Extensor digitorum brevis (*cut*)
Fibularis brevis tendon (*cut*)
Fibularis tertius tendon (*cut*)
Abductor digiti minimi
Dorsal metatarsal aa.
Metatarsal bones
Dorsal interosseous mm.
Lateral dorsal cutaneous n. (*cut*)
Anterior perforating branches of plantar metatarsal aa.
Dorsal digital aa. of foot
Proper plantar digital aa. and nn.
Tibialis anterior m. and tendon
Tibia
Anterior tibial a.
Deep fibular n.
Extensor hallucis longus and tendon
Anterior medial malleolar a.
Medial malleolus
Medial branch of deep fibular n.
Medial tarsal aa.
Dorsalis pedis a.
Arcuate a.
Posterior perforating branches of plantar metatarsal aa.
Deep plantar a.
Abductor hallucis
Extensor hallucis longus tendon
Extensor hallucis brevis tendon (*cut*)
Extensor digitorum brevis tendons (*cut*)
Extensor digitorum longus tendons (*cut*)
Extensor expansions of foot
Dorsal digital branches of deep fibular n.
Dorsal digital branches of superficial fibular n.
F. Netter M.D.

Sole of Foot: Superficial Dissection


Superficial transverse metatarsal ligaments
Proper plantar digital aa. and nn.
Superficial branches of medial plantar a. and n.
Transverse fasciculi of plantar aponeurosis
Longitudinal fasciculi of plantar aponeurosis
Medial plantar fascia
Lateral plantar fascia
Cutaneous branches of lateral plantar a. and n.
Cutaneous branches of medial plantar a. and n.
Calcaneometatarsal ligament
Plantar aponeurosis
Calcaneal branches of posterior tibial a.
Medial calcaneal branches of tibial n.
Calcaneal tuberosity
F. Netter M.D.

Muscles of Sole of Foot: First Layer

See also Plates 553, BP 109

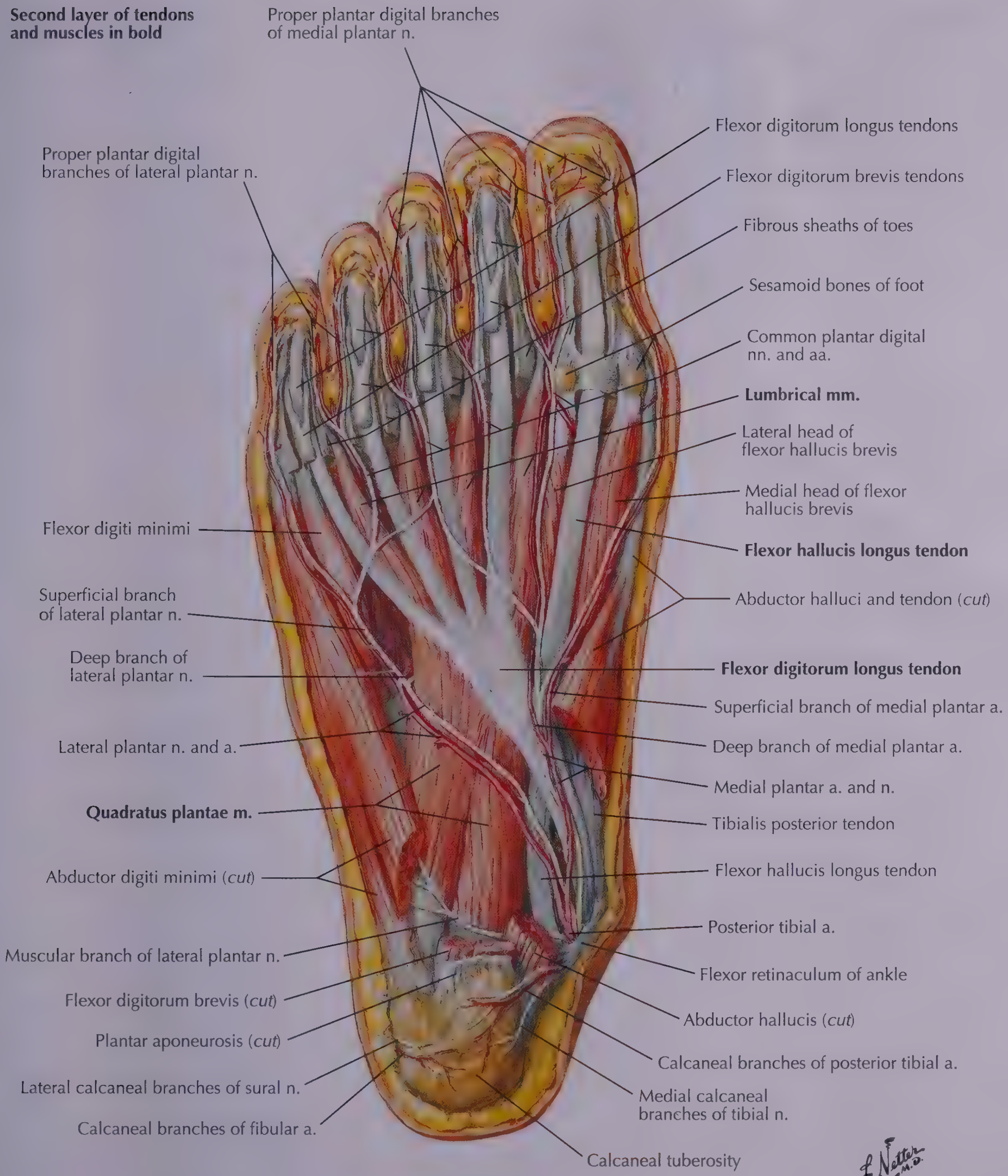


First layer of muscles in bold

Proper plantar digital branches of medial plantar n.
Proper plantar digital branches of lateral plantar n.
Proper plantar digital aa.
Common plantar digital aa.
Lumbrical mm.
Fibrous sheaths of toes
Superficial branch of medial plantar a.
Lateral head of flexor hallucis brevis
Medial head of flexor hallucis brevis
Flexor digitorum brevis tendons
Flexor digitorum longus tendons
Plantar metatarsal a.
Flexor hallucis longus tendon
Flexor digiti minimi
Abductor hallucis and tendon
Abductor digiti minimi
Flexor digitorum brevis
Lateral plantar fascia
Plantar aponeurosis (*cut*)
Calcaneal branches of posterior tibial a.
Medial process of calcaneal tuberosity
Medial calcaneal branches of tibial n.
Lateral process of calcaneal tuberosity
Calcaneal tuberosity

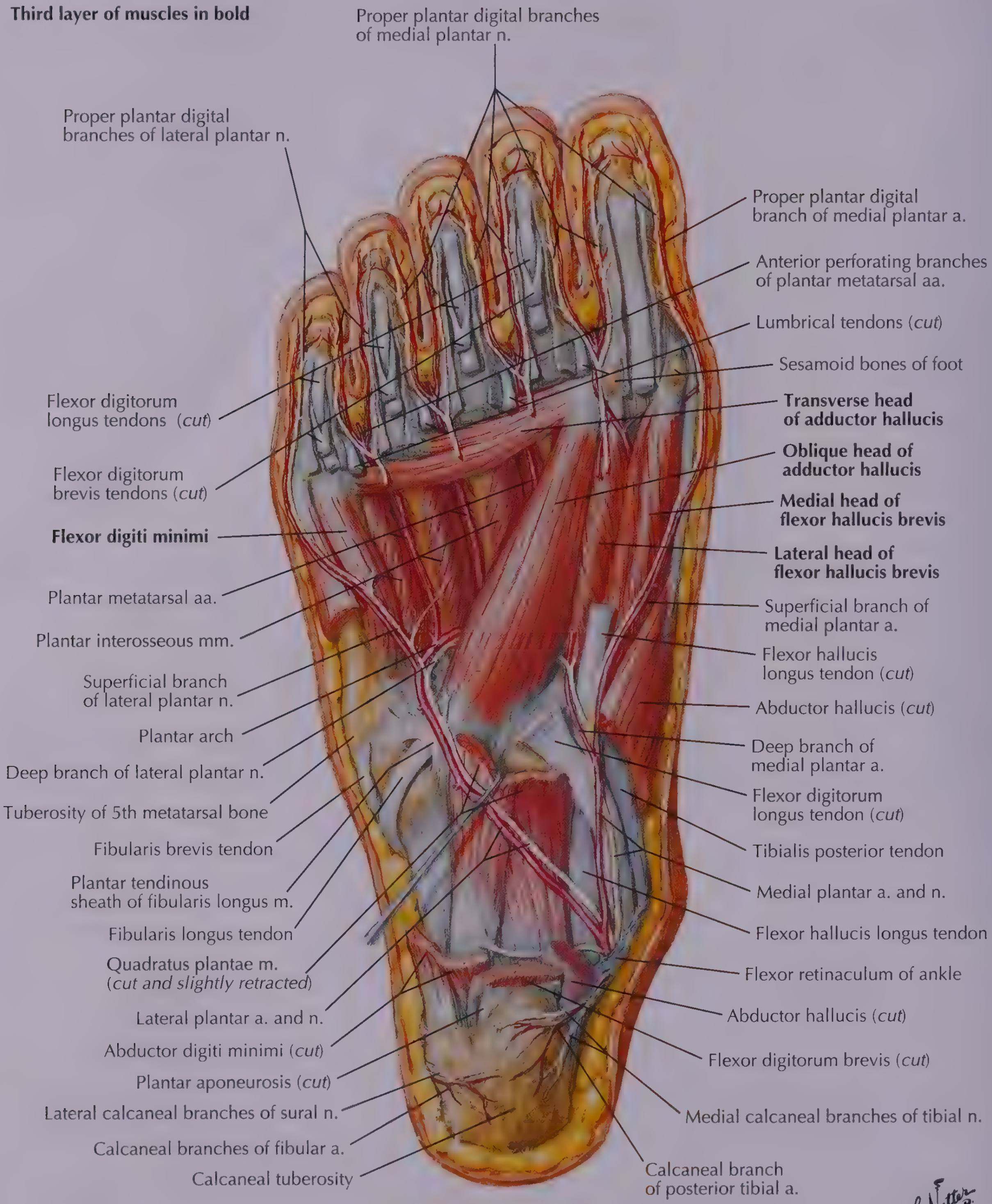
Muscles of Sole of Foot: Second Layer

See also Plates 553, BP 109


Second layer of tendons and muscles in bold
Proper plantar digital branches of medial plantar n.
Proper plantar digital branches of lateral plantar n.
Flexor digiti minimi
Superficial branch of lateral plantar n.
Deep branch of lateral plantar n.
Lateral plantar n. and a.
Quadratus plantae m.
Abductor digiti minimi (*cut*)
Muscular branch of lateral plantar n.
Flexor digitorum brevis (*cut*)
Plantar aponeurosis (*cut*)
Lateral calcaneal branches of sural n.
Calcaneal branches of fibular a.
Flexor digitorum longus tendons
Flexor digitorum brevis tendons
Fibrous sheaths of toes
Sesamoid bones of foot
Common plantar digital nn. and aa.
Lumbrical mm.
Lateral head of flexor hallucis brevis
Medial head of flexor hallucis brevis
Flexor hallucis longus tendon
Abductor halluci and tendon (*cut*)
Flexor digitorum longus tendon
Superficial branch of medial plantar a.
Deep branch of medial plantar a.
Medial plantar a. and n.
Tibialis posterior tendon
Flexor hallucis longus tendon
Posterior tibial a.
Flexor retinaculum of ankle
Abductor hallucis (*cut*)
Calcaneal branches of posterior tibial a.
Medial calcaneal branches of tibial n.
Calcaneal tuberosity

Muscles of Sole of Foot: Third Layer

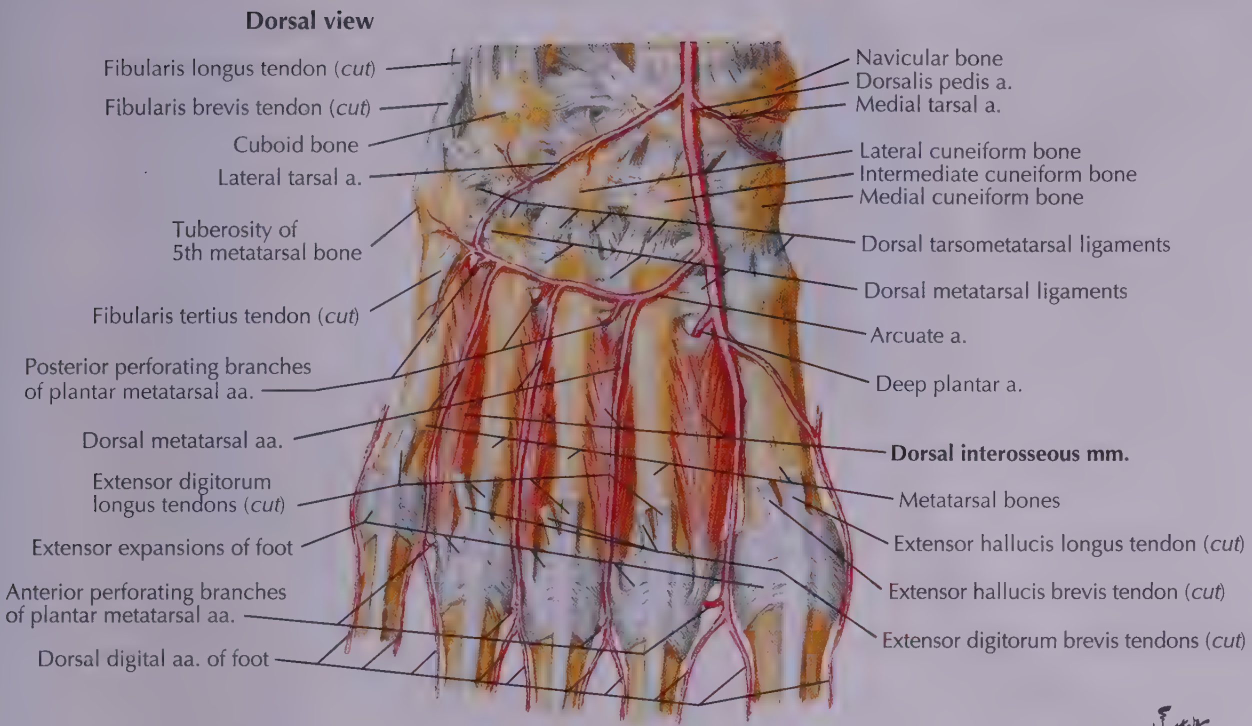
See also Plate BP 109

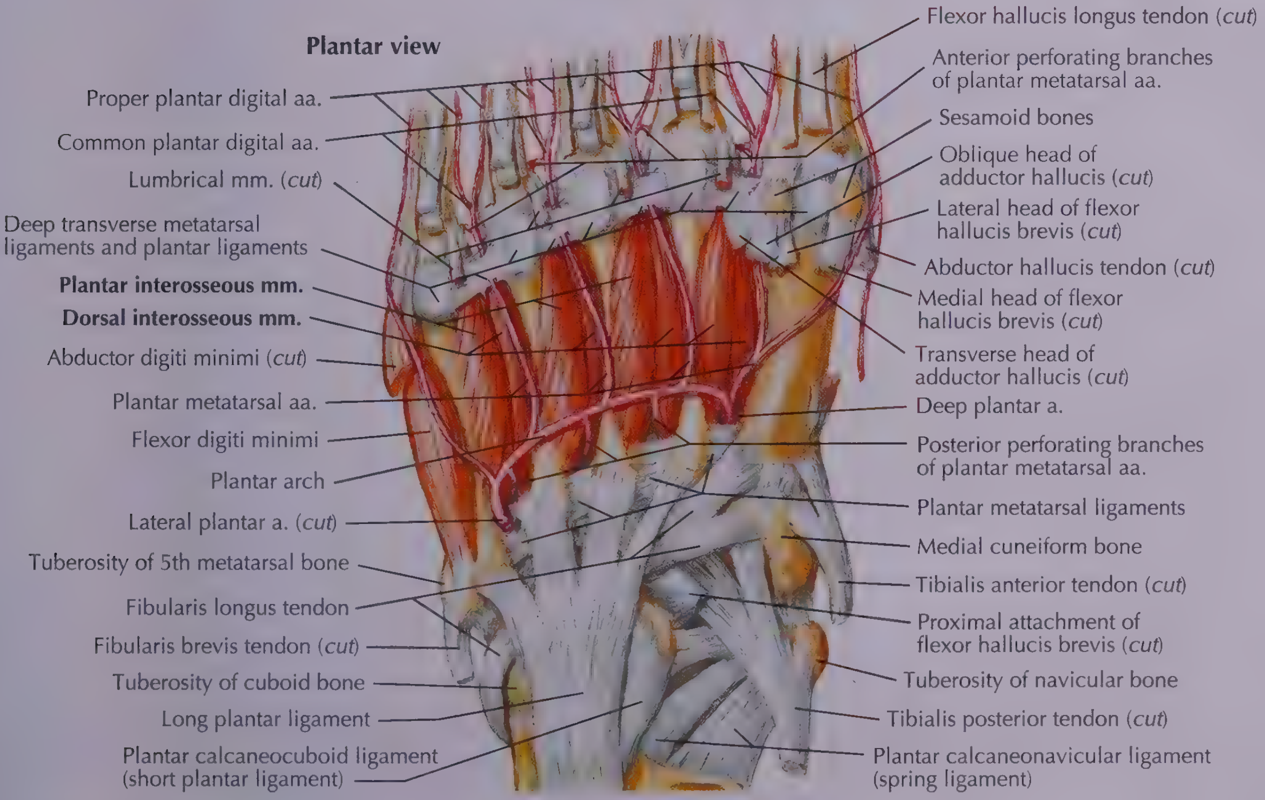

Third layer of muscles in bold

Proper plantar digital branches of medial plantar n.
Proper plantar digital branches of lateral plantar n.
Flexor digitorum longus tendons (*cut*)
Flexor digitorum brevis tendons (*cut*)
Flexor digiti minimi
Plantar metatarsal aa.
Plantar interosseous mm.
Superficial branch of lateral plantar n.
Plantar arch
Deep branch of lateral plantar n.
Tuberosity of 5th metatarsal bone
Fibularis brevis tendon
Plantar tendinous sheath of fibularis longus m.
Fibularis longus tendon
Quadratus plantae m. (*cut and slightly retracted*)
Lateral plantar a. and n.
Abductor digiti minimi (*cut*)
Plantar aponeurosis (*cut*)
Lateral calcaneal branches of sural n.
Calcaneal branches of fibular a.
Calcaneal tuberosity
Proper plantar digital branch of medial plantar a.
Anterior perforating branches of plantar metatarsal aa.
Lumbrical tendons (*cut*)
Sesamoid bones of foot
Transverse head of adductor hallucis
Oblique head of adductor hallucis
Medial head of flexor hallucis brevis
Lateral head of flexor hallucis brevis
Superficial branch of medial plantar a.
Flexor hallucis longus tendon (*cut*)
Abductor hallucis (*cut*)
Deep branch of medial plantar a.
Flexor digitorum longus tendon (*cut*)
Tibialis posterior tendon
Medial plantar a. and n.
Flexor hallucis longus tendon
Flexor retinaculum of ankle
Abductor hallucis (*cut*)
Flexor digitorum brevis (*cut*)
Medial calcaneal branches of tibial n.
Calcaneal branch of posterior tibial a.
F. Netter M.D.

Interosseous Muscles and Deep Arteries of Foot

See also Plates 532, 542, 546, BP 109

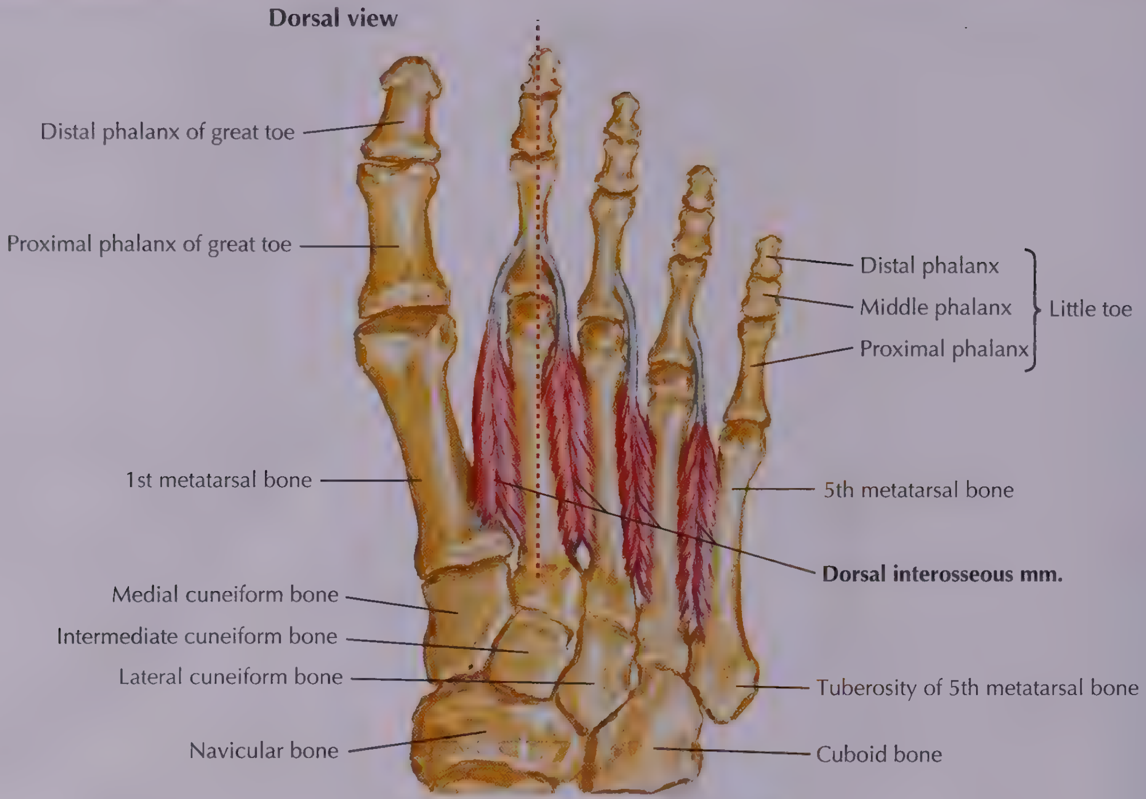

Dorsal view
Fibularis longus tendon (*cut*)
Fibularis brevis tendon (*cut*)
Cuboid bone
Lateral tarsal a.
Tuberosity of 5th metatarsal bone
Fibularis tertius tendon (*cut*)
Posterior perforating branches of plantar metatarsal aa.
Dorsal metatarsal aa.
Extensor digitorum longus tendons (*cut*)
Extensor expansions of foot
Anterior perforating branches of plantar metatarsal aa.
Dorsal digital aa. of foot
Navicular bone
Dorsalis pedis a.
Medial tarsal a.
Lateral cuneiform bone
Intermediate cuneiform bone
Medial cuneiform bone
Dorsal tarsometatarsal ligaments
Dorsal metatarsal ligaments
Arcuate a.
Deep plantar a.
Dorsal interosseous mm.
Metatarsal bones
Extensor hallucis longus tendon (*cut*)
Extensor hallucis brevis tendon (*cut*)
Extensor digitorum brevis tendons (*cut*)

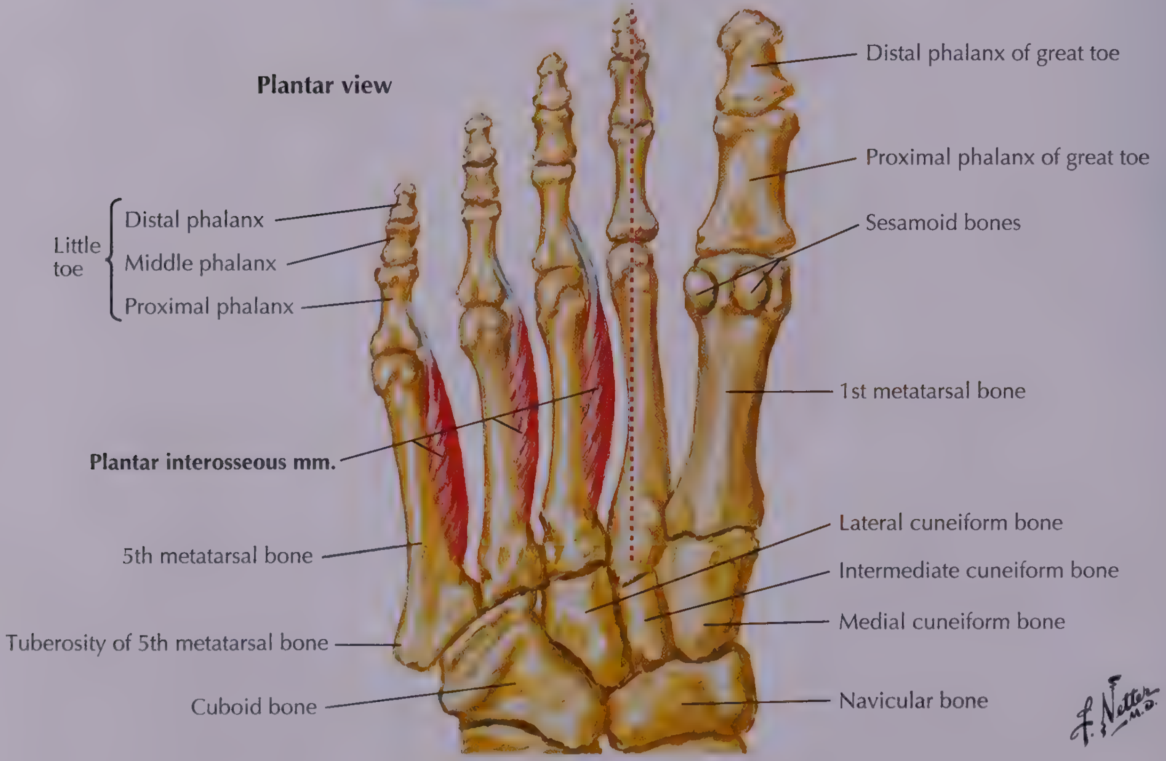

Plantar view
Proper plantar digital aa.
Common plantar digital aa.
Lumbrical mm. (*cut*)
Deep transverse metatarsal ligaments and plantar ligaments
Plantar interosseous mm.
Dorsal interosseous mm.
Abductor digiti minimi (*cut*)
Plantar metatarsal aa.
Flexor digiti minimi
Plantar arch
Lateral plantar a. (*cut*)
Tuberosity of 5th metatarsal bone
Fibularis longus tendon
Fibularis brevis tendon (*cut*)
Tuberosity of cuboid bone
Long plantar ligament
Plantar calcaneocuboid ligament (short plantar ligament)
Flexor hallucis longus tendon (*cut*)
Anterior perforating branches of plantar metatarsal aa.
Sesamoid bones
Oblique head of adductor hallucis (*cut*)
Lateral head of flexor hallucis brevis (*cut*)
Abductor hallucis tendon (*cut*)
Medial head of flexor hallucis brevis (*cut*)
Transverse head of adductor hallucis (*cut*)
Deep plantar a.
Posterior perforating branches of plantar metatarsal aa.
Plantar metatarsal ligaments
Medial cuneiform bone
Tibialis anterior tendon (*cut*)
Proximal attachment of flexor hallucis brevis (*cut*)
Tuberosity of navicular bone
Tibialis posterior tendon (*cut*)
Plantar calcaneonavicular ligament (spring ligament)

Fourth layer of muscles in bold

Interosseous Muscles of Foot

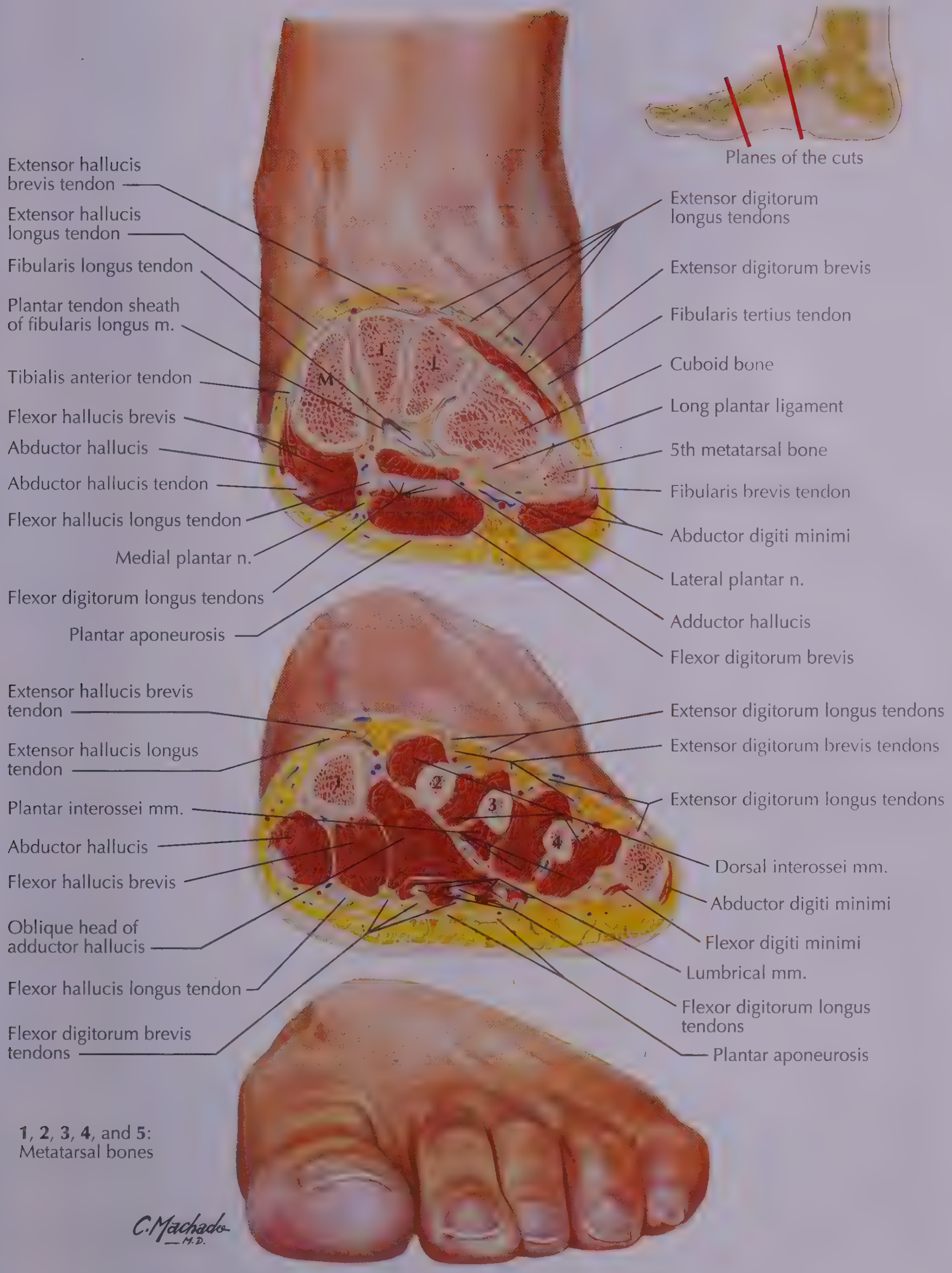
See also Plate 547


Dorsal view
Distal phalanx of great toe
Proximal phalanx of great toe
Distal phalanx
Middle phalanx
Proximal phalanx
Little toe
1st metatarsal bone
5th metatarsal bone
Dorsal interosseous mm.
Medial cuneiform bone
Intermediate cuneiform bone
Lateral cuneiform bone
Tuberosity of 5th metatarsal bone
Navicular bone
Cuboid bone


Plantar view
Distal phalanx of great toe
Proximal phalanx of great toe
Sesamoid bones
Little toe
Distal phalanx
Middle phalanx
Proximal phalanx
1st metatarsal bone
Plantar interosseous mm.
Lateral cuneiform bone
Intermediate cuneiform bone
5th metatarsal bone
Medial cuneiform bone
Tuberosity of 5th metatarsal bone
Cuboid bone
Navicular bone

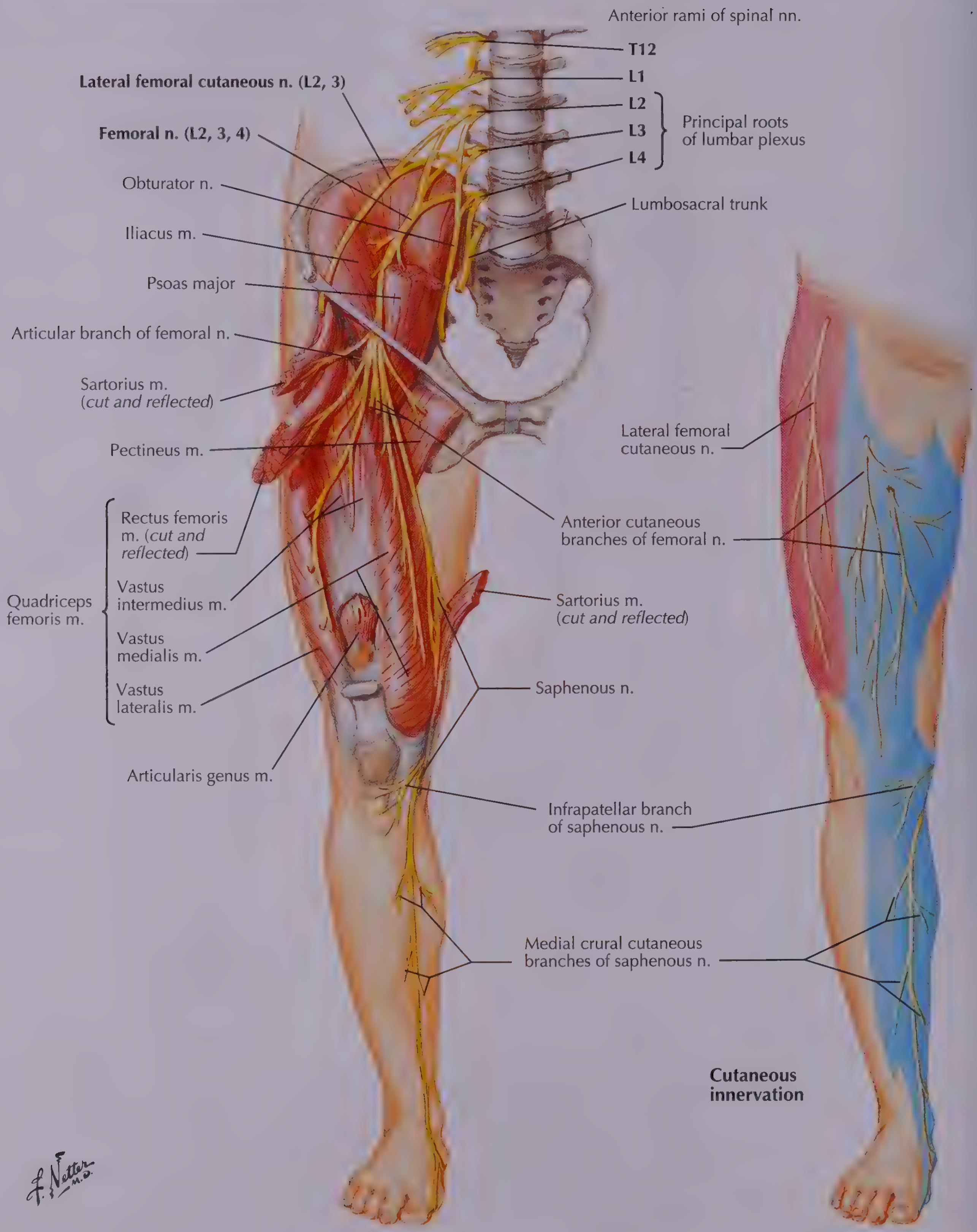
Note: dashed line is the line of reference for abduction and adduction of the toes

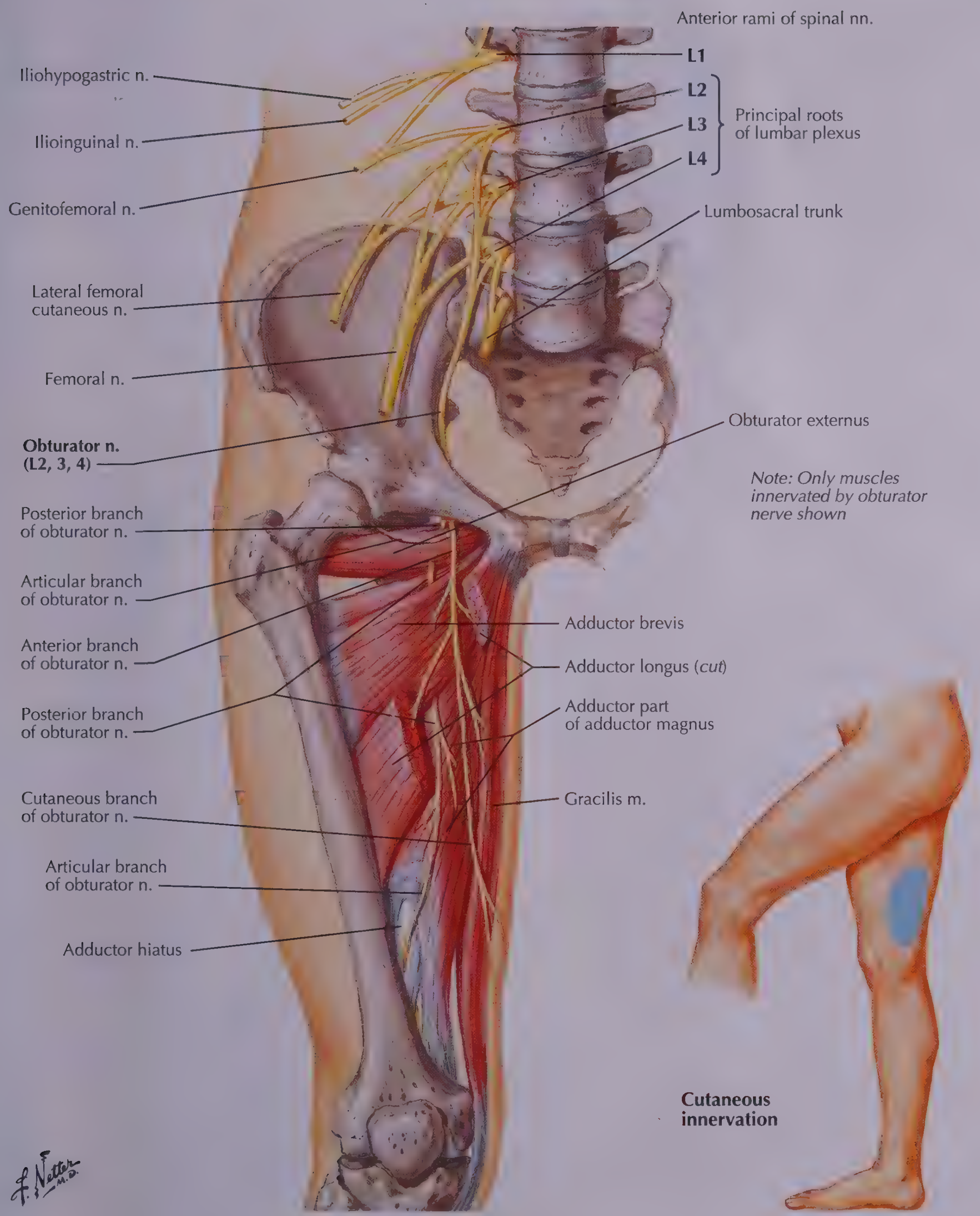
M = Medial cuneiform bone
I = Intermediate cuneiform bone
L = Lateral cuneiform bone


Planes of the cuts
Extensor hallucis brevis tendon
Extensor hallucis longus tendon
Fibularis longus tendon
Plantar tendon sheath of fibularis longus m.
Tibialis anterior tendon
Flexor hallucis brevis
Abductor hallucis
Abductor hallucis tendon
Flexor hallucis longus tendon
Medial plantar n.
Flexor digitorum longus tendons
Plantar aponeurosis
Extensor digitorum longus tendons
Extensor digitorum brevis
Fibularis tertius tendon
Cuboid bone
Long plantar ligament
5th metatarsal bone
Fibularis brevis tendon
Abductor digiti minimi
Lateral plantar n.
Adductor hallucis
Flexor digitorum brevis
M
I
L
Extensor hallucis brevis tendon
Extensor hallucis longus tendon
Plantar interossei mm.
Abductor hallucis
Flexor hallucis brevis
Oblique head of adductor hallucis
Flexor hallucis longus tendon
Flexor digitorum brevis tendons
Extensor digitorum longus tendons
Extensor digitorum brevis tendons
Extensor digitorum longus tendons
Dorsal interossei mm.
Abductor digiti minimi
Flexor digiti minimi
Lumbrical mm.
Flexor digitorum longus tendons
Plantar aponeurosis
1
2
3
4
5
1, **2**, **3**, **4**, and **5**: Metatarsal bones
C.Machado M.D.

Femoral Nerve and Lateral Femoral Cutaneous Nerve

See also Plates 287, 509, 510


Anterior rami of spinal nn.
T12
L1
L2
L3
L4
Principal roots of lumbar plexus
Lateral femoral cutaneous n. (L2, 3)
Femoral n. (L2, 3, 4)
Obturator n.
Iliacus m.
Psoas major
Articular branch of femoral n.
Sartorius m. (*cut and reflected*)
Pectineus m.
Lumbosacral trunk
Quadriceps femoris m.
Rectus femoris m. (*cut and reflected*)
Vastus intermedius m.
Vastus medialis m.
Vastus lateralis m.
Articularis genus m.
Lateral femoral cutaneous n.
Anterior cutaneous branches of femoral n.
Sartorius m. (*cut and reflected*)
Saphenous n.
Infrapatellar branch of saphenous n.
Medial crural cutaneous branches of saphenous n.
Cutaneous innervation

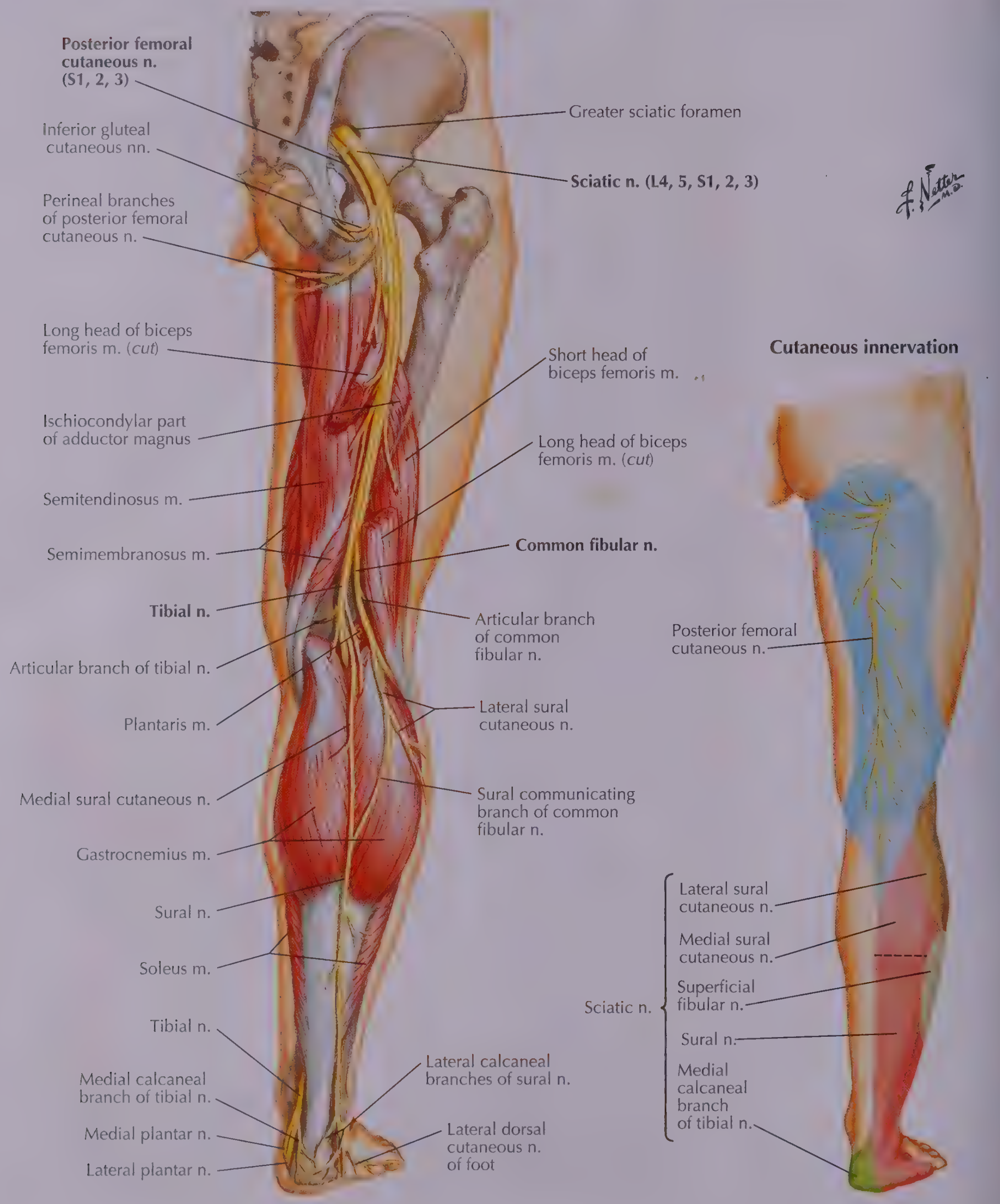

Anterior rami of spinal nn.
L1
L2
L3
L4
Principal roots of lumbar plexus
Iliohypogastric n.
Ilioinguinal n.
Genitofemoral n.
Lumbosacral trunk
Lateral femoral cutaneous n.
Femoral n.
Obturator n. (L2, 3, 4)
Obturator externus
Posterior branch of obturator n.
Articular branch of obturator n.
Anterior branch of obturator n.
Adductor brevis
Adductor longus (*cut*)
Adductor part of adductor magnus
Posterior branch of obturator n.
Gracilis m.
Cutaneous branch of obturator n.
Articular branch of obturator n.
Adductor hiatus
F. Netter M.D.

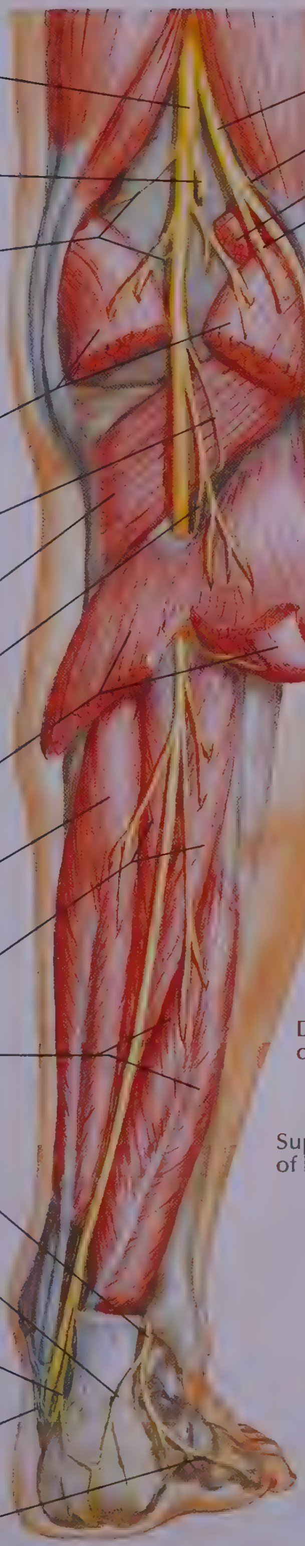
Note: Only muscles innervated by obturator nerve shown

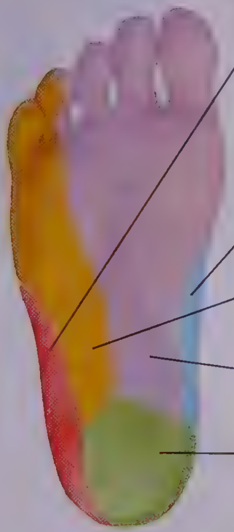
Cutaneous innervation

Sciatic Nerve and Posterior Femoral Cutaneous Nerve

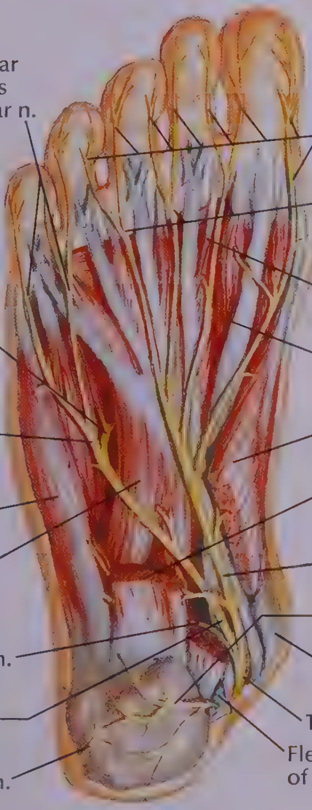
[illegible]


Posterior femoral cutaneous n. (S1, 2, 3)
Inferior gluteal cutaneous nn.
Perineal branches of posterior femoral cutaneous n.
Long head of biceps femoris m. (*cut*)
Ischiocondylar part of adductor magnus
Semitendinosus m.
Semimembranosus m.
Tibial n.
Articular branch of tibial n.
Plantaris m.
Medial sural cutaneous n.
Gastrocnemius m.
Sural n.
Soleus m.
Tibial n.
Medial calcaneal branch of tibial n.
Medial plantar n.
Lateral plantar n.
Greater sciatic foramen
Sciatic n. (L4, 5, S1, 2, 3)
Short head of biceps femoris m.
Long head of biceps femoris m. (*cut*)
Common fibular n.
Articular branch of common fibular n.
Lateral sural cutaneous n.
Sural communicating branch of common fibular n.
Lateral calcaneal branches of sural n.
Lateral dorsal cutaneous n. of foot
F. Netter M.D.
Cutaneous innervation
Posterior femoral cutaneous n.
Sciatic n.
Lateral sural cutaneous n.
Medial sural cutaneous n.
Superficial fibular n.
Sural n.
Medial calcaneal branch of tibial n.


Tibial n. (L4, 5, S1, 2, 3)
Common fibular n.
Articular branch of common fibular n.
Plantaris m. (*cut*)
Lateral sural cutaneous n. (*cut*)
Medial sural cutaneous n. (*cut*)
Articular branches of tibial n.
Gastrocnemius m. (*cut*)
Muscular branch of tibial n.
Popliteus m.
Crural interosseous n.
Soleus m. (*cut and partly retracted*)
Flexor digitorum longus
Tibialis posterior m.
Flexor hallucis longus
Sural n. (*cut*)
Lateral calcaneal branch of sural n.
Medial calcaneal branch of tibial n.
Flexor retinaculum of ankle (*cut*)
Lateral dorsal cutaneous n. of foot
F. Netter M.D.

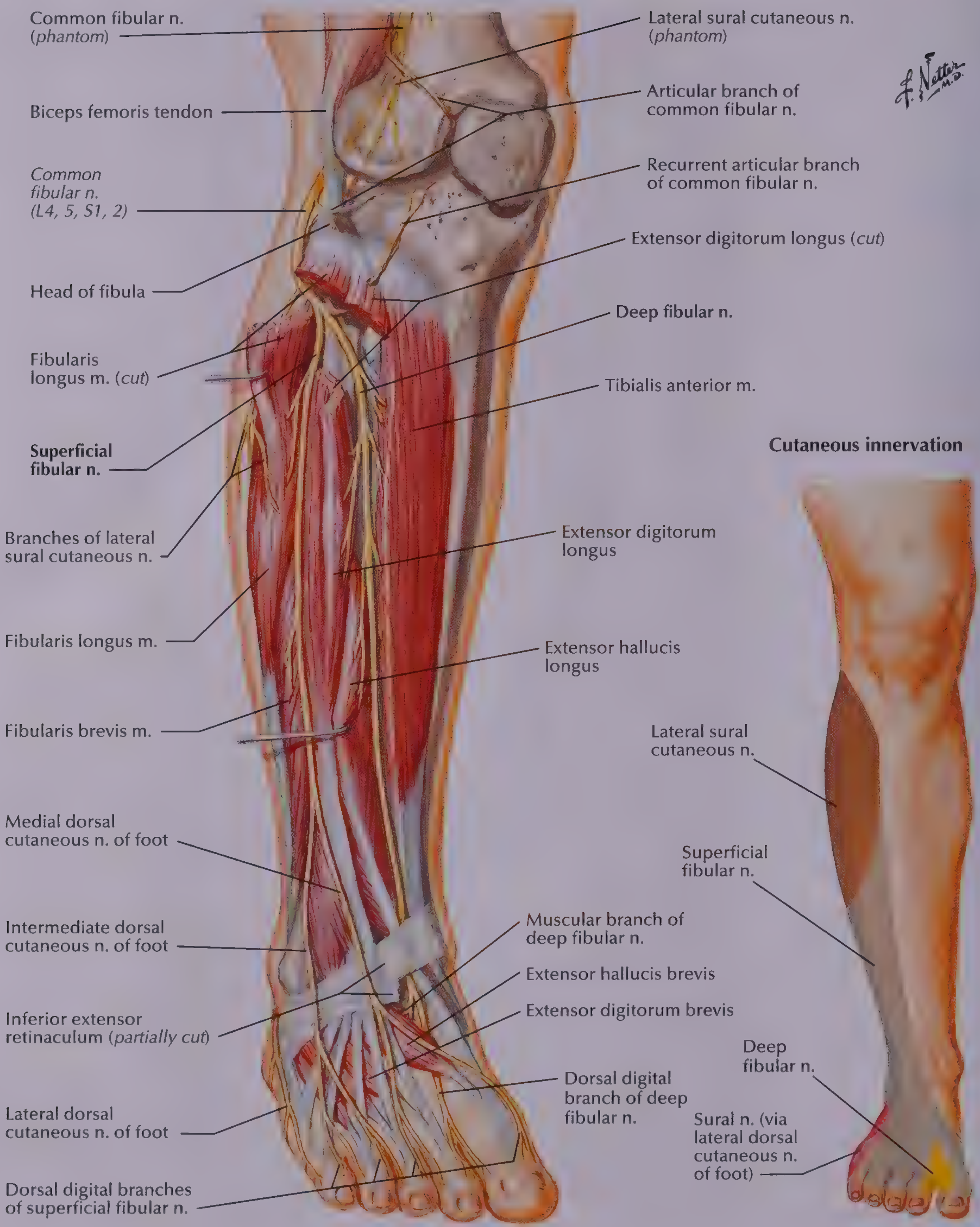

Sural n. (via lateral calcaneal branches and lateral dorsal cutaneous n. of foot)
Saphenous n.
Lateral plantar n.
Medial plantar n.
Medial calcaneal branches
Tibial n.

Cutaneous innervation of plantar region


Common plantar digital branches of lateral plantar n.
Proper plantar digital branches of medial plantar n.
Common plantar digital branches of medial plantar n.
1st lumbrical m.
Deep branch of lateral plantar n.
Flexor hallucis brevis
Superficial branch of lateral plantar n.
Abductor hallucis
Abductor digiti minimi
Flexor digitorum brevis (*cut*)
Quadratus plantae m.
Medial plantar n.
Muscular branch of tibial n.
Medial calcaneal branch of tibial n.
Flexor retinaculum of ankle (*cut*)
Lateral plantar n.
Tibial n.
Lateral calcaneal branch of sural n.
Flexor retinaculum of ankle (*cut*)

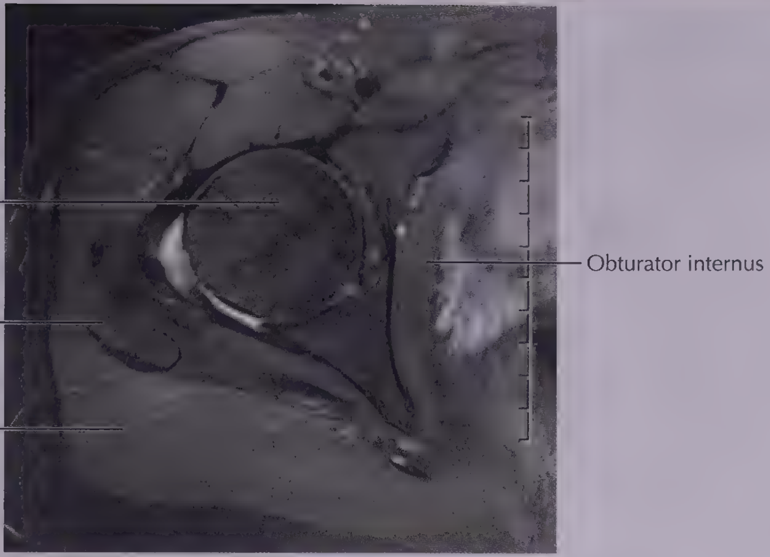
Common Fibular Nerve

See also Plates 530, 532

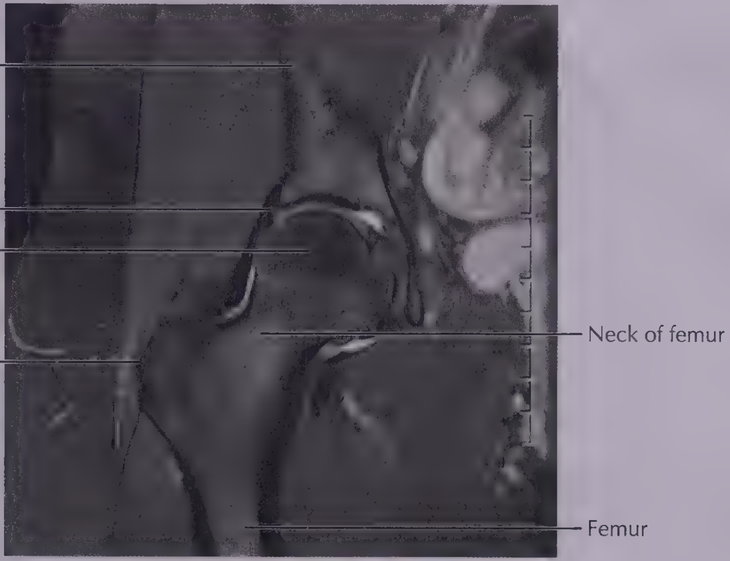

Common fibular n. (*phantom*)
Biceps femoris tendon
Common fibular n. (L4, 5, S1, 2)
Head of fibula
Fibularis longus m. (*cut*)
Superficial fibular n.
Branches of lateral sural cutaneous n.
Fibularis longus m.
Fibularis brevis m.
Medial dorsal cutaneous n. of foot
Intermediate dorsal cutaneous n. of foot
Inferior extensor retinaculum (*partially cut*)
Lateral dorsal cutaneous n. of foot
Dorsal digital branches of superficial fibular n.
Lateral sural cutaneous n. (*phantom*)
Articular branch of common fibular n.
Recurrent articular branch of common fibular n.
Extensor digitorum longus (*cut*)
Deep fibular n.
Tibialis anterior m.
Extensor digitorum longus
Extensor hallucis longus
Muscular branch of deep fibular n.
Extensor hallucis brevis
Extensor digitorum brevis
Dorsal digital branch of deep fibular n.
Cutaneous innervation
Lateral sural cutaneous n.
Superficial fibular n.
Deep fibular n.
Sural n. (via lateral dorsal cutaneous n. of foot)

See also Plates 353, 420, 514

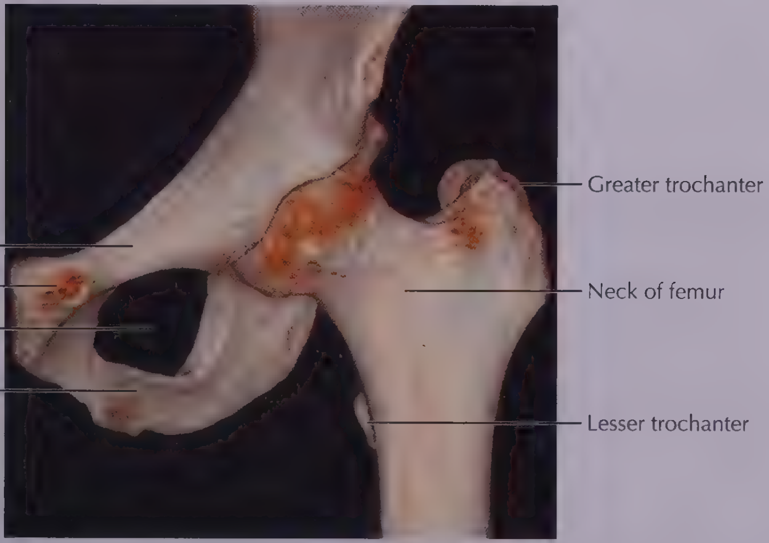
Axial T2-weighted MRI


Head of femur
Greater trochanter
Gluteus maximus m.
Obturator internus

Coronal T2-weighted MRI


Ala of ilium
Acetabular labrum
Head of femur
Greater trochanter
Neck of femur
Femur

3D CT of hip


Greater trochanter
Superior pubic ramus
Pubic tubercle
Neck of femur
Obturator foramen
Ischiopubic ramus
Lesser trochanter

ANATOMICAL STRUCTURE	CLINICAL COMMENT	PLATE NUMBERS
Muscular System—Continued		
Semitendinosus and semimembranosus muscles and long head of biceps femoris muscle	Excessive stretching or tearing of hamstring muscles occurs most often during high-speed running or activities with high kicks	504
Piriformis muscle	Piriformis muscle strain or structural variations (e.g., split piriformis muscle) may produce compression of sciatic nerve	511
Gluteus medius and minimus muscles	Paralysis results in contralateral pelvic dip due to weakened hip abduction when standing on affected limb (Trendelenburg sign or gait)	512
Calcaneal (Achilles') tendon	Inflammation results from repetitive stress on tendon, often from running on uneven surfaces; extreme stress may cause tendon to rupture; striking calcaneal tendon with reflex hammer elicits ankle (ankle jerk) reflex to test S1–S2 spinal cord levels (innervation of superficial calf muscles by tibial nerve)	527, 528, 538
Compartments of leg	Acute compartment syndrome may occur after trauma, such as long bone fracture, that increases compartment pressure and thereby compromises vascular flow; symptoms include pain, paresthesias, pallor, pulselessness, and paralysis (five P's); fasciotomy often required to relieve pressure	534
Plantar aponeurosis	Inflammation results from increased tension, weight, or overuse, causing heel and foot pain (plantar fasciitis)	543
Cardiovascular System		
Femoral vein	Common site of vascular access for central venous catheters; however, risk of catheter infection is greater than with jugular or subclavian vein access	509
Deep veins of lower limb	Venous thrombosis of deep leg veins is due to venous stasis, vessel injury, and/or coagulation disorders (Virchow's triad); can lead to thrombus formation and thromboemboli, such as to the lungs	533
Great saphenous vein	Often used as graft in coronary artery bypass surgery	492
Superficial veins of lower limb	Varicose veins are dilated, tortuous superficial veins, often associated with reflux of superficial and/or deep veins; progressive venous disease may cause edema, pain, and ulceration	492, 533
Femoral artery	Common site of vascular access for percutaneous cardiac and vascular procedures; target is segment between origins of inferior epigastric and deep femoral arteries, generally identified using fluoroscopy by its location alongside the femoral head; "high stick" (too cephalad) may result in retroperitoneal hemorrhage	522
Femoral, popliteal, tibial, and fibular arteries	Peripheral arterial disease due to atherosclerosis may occur in major arteries of lower limb, resulting in reduced blood flow; patients experience claudication (cramping pain in thigh or calf) upon exertion	522
Arteries of lower limb	Pulse points: femoral artery in femoral triangle, popliteal artery in deep popliteal region of knee, anterior tibial artery between extensor hallucis longus and extensor digitorum longus at ankle joint, dorsalis pedis artery on dorsum of foot, and posterior tibial artery in tarsal tunnel posterior to medial malleolus	14, 509, 527, 540, 541
Lymph Vessels and Lymphoid Organs		
Superficial inguinal nodes	Superficial inguinal nodes drain lower limb, gluteal region, lower abdominal region, and perineum; are palpable when enlarged	494
Lymph vessels of lower limb	Lymphedema (stasis of lymph flow in lymph vessels obstructed by inflammation, fibrosis, tumor, or abnormally small diameter)	494

*Selections were based largely on clinical data and commonly discussed clinical correlations in macroscopic ("gross") anatomy courses.

The lumbosacral plexus includes the lumbar, sacral, and coccygeal plexuses, whose roots are the anterior rami of spinal nerves (lumbar plexus: typically L2–L4 with a small contribution from L1; sacral plexus: L4–S4; coccygeal plexus: S4–Co). Variation in the spinal nerve contributions to the plexuses, and the nerves that arise from these plexuses, is common and can be due to a prefixed (high) or postfixed (low) plexus.

NERVE	ORIGIN	COURSE	BRANCHES	MOTOR	CUTANEOUS
Lateral femoral cutaneous nerve	Posterior divisions of lumbar plexus (L2–L3)	Courses posterior to or through inguinal ligament medial to anterior superior iliac spine, then travels superficially in lateral thigh			Lateral thigh
Femoral nerve	Posterior divisions of lumbar plexus (L2–L4)	Passes posterior to inguinal ligament to lie on iliacus muscle in femoral triangle	Muscular and anterior cutaneous branches, saphenous nerve	Anterior compartment of thigh, iliacus and pectineus muscles	Anterior thigh (see also saphenous nerve)
Saphenous nerve	Femoral nerve	Leaves femoral nerve in adductor canal, pierces fascia lata to travel superficially with great saphenous vein	Infrapatellar and medial crural cutaneous branches		Medial knee, leg, ankle, and foot
Genitofemoral nerve	Anterior divisions of lumbar plexus (L1–L2)	Runs on anterior surface of psoas major; genital branch traverses inguinal canal; femoral branch courses into femoral triangle by passing deep to inguinal ligament	Genital and femoral branches	Cremaster	Lateral part of femoral triangle, anterior scrotum/vulva
Obturator nerve	Anterior divisions of lumbar plexus (L2–L4)	At L5 vertebra passes deep to common iliac vessels, enters medial thigh via obturator foramen	Anterior and posterior branches	Medial compartment of thigh	Medial thigh
Superior gluteal nerve	Posterior divisions of sacral plexus (L4–S1)	Exits pelvis via greater sciatic foramen superior to piriformis muscle		Gluteus medius and minimus muscles, tensor fasciae latae	
Inferior gluteal nerve	Posterior divisions of sacral plexus (L5–S2)	Exits pelvis via greater sciatic foramen inferior to piriformis muscle		Gluteus maximus muscle	
Nerve to piriformis muscle	Posterior divisions of sacral plexus (S1–S2)	Innervates piriformis muscle near where it exits pelvis via greater sciatic foramen		Piriformis muscle	
Perforating cutaneous nerve	Posterior divisions of sacral plexus (S2–S3)	Exits pelvis and pierces sacrotuberous ligament			Inferomedial gluteal region
Nerve to obturator internus	Anterior divisions of sacral plexus (L5–S2)	Exits pelvis via greater sciatic foramen, inferior to piriformis muscle; re-enters pelvis via lesser sciatic foramen to innervate obturator internus		Obturator internus and superior gemellus muscle	
Nerve to quadratus femoris muscle	Anterior divisions of sacral plexus (L4–S1)	Exits pelvis via greater sciatic foramen inferior to piriformis muscle		Quadratus femoris and inferior gemellus muscles	
Nerve to levator ani	Anterior divisions of sacral plexus (S3–S4)	From its source, travels on superior surface of levator ani		Iliococcygeus and pubococcygeus muscles	
Nerve to coccygeus muscle	Anterior divisions of sacral plexus (S3–S4)	From its source, travels on superior surface of coccygeus muscle		Coccygeus (ischiococcygeus) muscle	
Pudendal nerve	Anterior divisions of sacral plexus (S2–S4)	Exits pelvis via greater sciatic foramen inferior to piriformis muscle; enters perineum via lesser sciatic foramen, coursing through ischioanal fossa and pudendal (Alcock's) canal	Inferior anal and perineal nerves, dorsal nerve of clitoris/penis	Perineal muscles, external anal sphincter, pubococcygeus muscle	Posterior scrotum/vulva, clitoris/penis
Posterior femoral cutaneous nerve	Anterior and posterior divisions of sacral plexus (S1–S3)	Exits pelvis via greater sciatic foramen inferior to piriformis muscle; runs inferiorly to gluteus maximus muscle and continues distally to popliteal fossa	Inferior gluteal cutaneous nerves, perineal branches		Inferior gluteal region, posterior thigh, popliteal region

Continued

Nerves of Lumbosacral Plexus **Table 8.3**

Nerves of Lumbosacral Plexus

NERVE	ORIGIN	COURSE	BRANCHES	MOTOR	CUTANEOUS
Sciatic nerve	Anterior and posterior divisions of sacral plexus (L4–S3)	Exits pelvis via greater sciatic foramen inferior to piriformis muscle, passing superficial to lateral rotators and deep to gluteus medius muscle to access thigh between greater trochanter of femur and ischial tuberosity	Muscular branches, tibial and common fibular nerves	Posterior compartment of thigh (also see branches)	See branches
Tibial nerve	Sciatic nerve	Courses through popliteal fossa and sural region deep to soleus muscle, traversing tarsal tunnel posterior to medial malleolus	Muscular and medial calcaneal branches, crural interosseous nerve, medial sural cutaneous nerve, medial and lateral plantar nerves	Posterior compartment of leg (also see branches)	Heel (also see branches)
Common fibular nerve	Sciatic nerve	Courses medial to biceps femoris muscle and lateral to lateral head of gastrocnemius muscle and neck of fibula	Superficial and deep fibular nerves, lateral sural cutaneous nerve, sural communicating branch	*See branches*	*See branches*
Deep fibular nerve	Common fibular nerve	Courses deep to fibularis longus muscle and extensor digitorum longus on surface of interosseous membrane of leg deep to extensor retinaculum	Muscular and dorsal digital branches	Anterior compartment of leg	Dorsal aspect of adjacent parts of toes 1 and 2
Superficial fibular nerve	Common fibular nerve	Courses between fibularis longus and brevis muscles in lateral compartment of leg, piercing crural fascia distally	Muscular branches, medial and intermediate dorsal cutaneous nerves of foot	Lateral compartment of leg	Inferior part of anterior leg, dorsum of foot and toes
Lateral sural cutaneous nerve	Common fibular nerve	Branches from common fibular nerve just proximal to plantaris muscle			Lateral leg
Medial sural cutaneous nerve	Tibial nerve	Branches from tibial nerve just proximal to plantaris muscle, runs between both heads of gastrocnemius muscle, pierces crural fascia	Sural nerve		Proximal posterolateral leg (also see sural nerve)
Sural nerve	Union of medial sural cutaneous nerve and sural communicating branch of common fibular nerve	Descends sural region along lateral calcaneal tendon and into foot between lateral malleolus and calcaneus	Lateral dorsal cutaneous nerve of foot		Distal posterolateral leg, lateral foot
Lateral plantar nerve	Tibial nerve	Passes deep to abductor hallucis brevis and travels between flexor digitorum brevis and quadratus plantae muscle	Superficial and deep branches	Abductor digiti minimi, adductor hallucis, flexor digiti minimi, quadratus plantae muscle, dorsal and plantar interossei muscles, lumbrical muscles (lateral three)	Lateral sole, plantar aspect of 5th toe and part of 4th toe
Medial plantar nerve	Tibial nerve	Passes deep to abductor hallucis brevis and runs anteriorly along medial border of flexor digitorum brevis	Muscular and common plantar digital branches	Abductor hallucis, flexor digitorum brevis, flexor hallucis brevis, lumbrical muscles (most medial one)	Medial sole, plantar aspect of toes 1–3, and part of 4th toe

MUSCLE	MUSCLE GROUP	PROXIMAL ATTACHMENT	DISTAL ATTACHMENT	INNERVATION	BLOOD SUPPLY	MAIN ACTIONS
Abductor digiti minimi of foot	Foot	Medial and lateral processes of tuberosity of calcaneus, plantar aponeurosis, intermuscular septum	Lateral surface of base of proximal phalanx of 5th digit	Lateral plantar nerve	Lateral plantar artery, plantar metatarsal and plantar digital arteries to 5th digit	Abducts and flexes 5th digit
Abductor hallucis	Foot	Medial process of tuberosity of calcaneus, flexor retinaculum, plantar aponeurosis	Medial surface of base of proximal phalanx of 1st digit	Medial plantar nerve	Medial plantar and 1st plantar metatarsal arteries	Abducts and flexes 1st digit
Adductor brevis	Medial thigh	Body and inferior ramus of pubis	Pectineal line and proximal part of linea aspera of femur	Obturator nerve	Deep femoral, medial circumflex femoral, and obturator arteries	Adducts thigh at hip, weak hip flexor
Adductor hallucis	Foot	*Oblique head:* bases of 2nd through 4th metatarsals *Transverse head:* ligaments of metatarsophalangeal joints of digits 3–5	Lateral surface of base of proximal phalanx of 1st digit	Lateral plantar nerve	Medial and lateral plantar arteries, plantar arch, plantar metatarsal arteries	Adducts 1st digit, maintains transverse arch of foot
Adductor longus	Medial thigh	Body of pubis inferior to pubic crest	Middle one-third of linea aspera of femur	Obturator nerve	Deep femoral and medial circumflex femoral arteries	Adducts thigh at hip
Adductor magnus	Medial thigh	*Adductor part:* ischiopubic ramus *Hamstring part:* ischial tuberosity	*Adductor part:* gluteal tuberosity, linea aspera, medial supracondylar line *Hamstring part:* adductor tubercle of femur	*Adductor part:* obturator nerve *Hamstring part:* sciatic nerve (tibial division)	Femoral, deep femoral, and obturator arteries	*Adductor part:* adducts and flexes thigh *Hamstring part:* extends thigh
Articularis genus m.	Anterior thigh	Anterior surface of distal femur	Suprapatellar bursa	Femoral nerve	Femoral artery	Pulls suprapatellar bursa superiorly with extension of knee
Biceps femoris m.	Posterior thigh	*Long head:* ischial tuberosity *Short head:* linea aspera and lateral supracondylar line of femur	Lateral surface of head of fibula	*Long head:* sciatic nerve (tibial division) *Short head:* sciatic nerve (common fibular division)	Perforating femoral arteries, inferior gluteal and medial circumflex femoral arteries	Flexes and laterally rotates leg, extends thigh
Dorsal interossei mm. of foot	Foot	Adjacent surfaces of 1st through 5th metatarsals	*Medial one:* medial surface of proximal phalanx of 2nd digit *Lateral three:* lateral surfaces of proximal phalanges of digits 2–4	Lateral plantar nerve	Arcuate artery, dorsal and plantar metatarsal arteries	Abduct 2nd through 4th digits of foot, flex metatarsophalangeal joints, and extend phalanges
Extensor digitorum brevis	Foot	Superolateral surface of calcaneus, lateral talocalcaneal ligament, deep surface of inferior extensor retinaculum	Lateral sides of tendons of extensor digitorum longus to digits 2–4	Deep fibular nerve	Dorsalis pedis, lateral tarsal, arcuate, and fibular arteries	Extends 2nd through 4th digits at metatarsophalangeal and interphalangeal joints
Extensor digitorum longus	Anterior leg	Lateral condyle of tibia, proximal three-fourths of anterior surfaces of interosseous membrane and fibula	Middle and distal phalanges of digits 2–5	Deep fibular nerve	Anterior tibial artery	Extends lateral four digits and dorsiflexes foot
Extensor hallucis brevis	Foot	Superolateral surface of calcaneus	Dorsal surface of proximal phalanx of great toe	Deep fibular nerve	Dorsalis pedis, lateral tarsal, arcuate, and fibular arteries	Extends great toe at metatarsophalangeal and interphalangeal joints

Continued

MUSCLE	MUSCLE GROUP	PROXIMAL ATTACHMENT	DISTAL ATTACHMENT	INNERVATION	BLOOD SUPPLY	MAIN ACTIONS
Extensor hallucis longus	Anterior leg	Middle part of anterior surfaces of fibula and interosseous membrane of leg	Dorsal surface of base of distal phalanx of great toe	Deep fibular nerve	Anterior tibial artery	Extends great toe, dorsiflexes foot
Fibularis brevis m.	Lateral leg	Distal two-thirds of lateral surface of fibula	Dorsal surface of tuberosity on lateral side of 5th metatarsal bone	Superficial fibular nerve	Anterior tibial and fibular arteries	Everts and plantar flexes foot
Fibularis longus m.	Lateral leg	Head of fibula, proximal two-thirds of lateral surface of fibula	Plantar surfaces of base of 1st metatarsal and of medial cuneiform bones	Superficial fibular nerve	Anterior tibial and fibular arteries	Everts and plantar flexes foot
Fibularis tertius m.	Anterior leg	Distal one-third of anterior surfaces of fibula and interosseous membrane of leg	Dorsal surface of base of 5th metatarsal bone	Deep fibular nerve	Anterior tibial artery	Dorsiflexes and everts foot
Flexor digiti minimi of foot	Foot	Base of 5th metatarsal bone	Lateral surface of base of proximal phalanx of 5th digit	Lateral plantar nerve	Lateral plantar artery, plantar digital artery to 5th digit, arcuate artery	Flexes proximal phalanx of 5th digit
Flexor digitorum brevis	Foot	Medial process of tuberosity of calcaneus, plantar aponeurosis, intermuscular septum	Both sides of middle phalangeal bones of digits 2–5	Medial plantar nerve	Medial and lateral plantar arteries, plantar arch, plantar metatarsal and plantar digital arteries	Flexes lateral four digits
Flexor digitorum longus	Posterior leg	Medial part of posterior tibia inferior to soleal line	Plantar surfaces of bases of distal phalanges of digits 2–5	Tibial nerve	Posterior tibial artery	Flexes lateral four digits and plantar flexes foot; supports longitudinal arches of foot
Flexor hallucis brevis	Foot	Plantar surfaces of cuboid bone and lateral cuneiform bone	Both sides of base of proximal phalanx of 1st digit	Medial plantar nerve	Medial plantar and 1st plantar metatarsal arteries	Flexes proximal phalanx of 1st digit
Flexor hallucis longus	Posterior leg	Distal two-thirds of posterior surfaces of fibula and interosseous membrane of leg	Base of distal phalanx of great toe	Tibial nerve	Fibular artery	Flexes all joints of great toe, plantar flexes foot
Gastrocnemius m.	Posterior leg	*Lateral head:* lateral surface of lateral condyle of femur *Medial head:* popliteal surface above medial condyle of femur	Posterior surface of calcaneus (via calcaneal tendon)	Tibial nerve	Popliteal and posterior tibial arteries	Plantar flexes foot, assists in flexion of knee
Gluteus maximus m.	Superficial gluteal	Ilium posterior to posterior gluteal line, dorsal surfaces of sacrum and coccyx, sacrotuberous ligament	Lateral condyle of tibia (via iliotibial tract), gluteal tuberosity of femur	Inferior gluteal nerve	Inferior and superior gluteal arteries	Extends flexed thigh, assists in lateral rotation, and abducts thigh
Gluteus medius m.	Superficial gluteal	Gluteal surface of ilium between anterior and posterior gluteal lines	Lateral surface of greater trochanter of femur	Superior gluteal nerve	Superior gluteal artery	Abducts and medially rotates thigh
Gluteus minimus m.	Superficial gluteal	Gluteal surface of ilium between anterior and inferior gluteal lines	Anterior surface of greater trochanter of femur	Superior gluteal nerve	Superior gluteal artery	Abducts and medially rotates thigh
Gracilis m.	Medial thigh	Body and inferior ramus of pubis	Superior part of medial surface of tibia	Obturator nerve	Deep femoral and medial circumflex femoral arteries	Adducts thigh, flexes and medially rotates leg

MUSCLE	MUSCLE GROUP	PROXIMAL ATTACHMENT	DISTAL ATTACHMENT	INNERVATION	BLOOD SUPPLY	MAIN ACTIONS
Iliacus m.	Iliopsoas	Superior two-thirds of iliac fossa, iliac crest, ala of sacrum, anterior sacroiliac ligament	Lesser trochanter and body of femur	Femoral nerve	Iliac branch of iliolumbar artery	Flexes thigh
Inferior gemellus m.	Deep gluteal	Ischial tuberosity	Greater trochanter of femur	Nerve to quadratus femoris muscle	Medial circumflex femoral artery	Laterally rotates extended thigh and abducts flexed thigh
Lumbrical mm. of foot	Foot	Tendons of flexor digitorum longus	Medial side of dorsal digital expansions of digits 2–5	*Medial one:* medial plantar nerve *Lateral three:* lateral plantar nerve	Lateral plantar artery, plantar metatarsal arteries	Flex proximal phalanges at metatarsophalangeal joint, extend phalanges at proximal and distal joints
Obturator externus	Medial thigh	Margins of obturator foramen, external surface of obturator membrane	Trochanteric fossa of femur	Obturator nerve	Medial circumflex femoral and obturator arteries	Laterally rotates thigh
Obturator internus	Deep gluteal	Pelvic surface of obturator membrane, margins of obturator foramen	Greater trochanter of femur	Nerve to obturator internus muscle	Internal pudendal and obturator arteries	Laterally rotates extended thigh, abducts flexed thigh
Pectineus m.	Medial thigh	Superior ramus of pubis	Pectineal line of femur	Femoral nerve (sometimes also obturator nerve)	Medial circumflex femoral and obturator arteries	Adducts and flexes thigh
Piriformis m.	Deep gluteal	Anterior surface of sacral segments 2–4, sacrotuberous ligament (inconstant)	Superior border of greater trochanter of femur	Nerve to piriformis muscle	Superior and inferior gluteal arteries, internal pudendal artery	Laterally rotates extended thigh, abducts flexed thigh
Plantar interossei mm.	Foot	Bases and medial sides of 3rd through 5th metatarsals	Medial surfaces of bases of proximal phalangeal bones of digits 3–5	Lateral plantar nerve	Lateral plantar artery, plantar arch, plantar metatarsal and plantar digital arteries	Adduct digits (3–5), flex metatarsophalangeal joint, and extend phalanges
Plantaris m.	Posterior leg	Inferior end of lateral supracondylar line of femur, oblique popliteal ligament	Posterior surface of calcaneus (via calcaneal tendon)	Tibial nerve	Popliteal artery	Weakly assists gastrocnemius
Popliteus m.	Posterior leg	Lateral surface of lateral condyle of femur, lateral meniscus	Posterior tibia superior to soleal line	Tibial nerve	Inferior medial and lateral genicular arteries	Flexes knee
Psoas major	Iliopsoas	Transverse processes of lumbar vertebrae, sides of bodies of T12–L5 vertebrae, intervening intervertebral discs	Lesser trochanter of femur	Anterior rami of L1–L3 spinal nerves	Lumbar branch of iliolumbar artery	Acting superiorly with iliacus, flexes hip; acting inferiorly, flexes vertebral column laterally; used to balance trunk in sitting position; acting inferiorly with iliacus, flexes trunk
Psoas minor	Iliopsoas	Lateral surfaces of bodies of T12 and L1 vertebrae, T12–L1 intervertebral disc	Pectineal line, iliopubic eminence	Anterior ramus of L1 spinal nerve	Lumbar branch of iliolumbar artery	Flexes pelvis on vertebral column
Quadratus femoris m.	Deep gluteal	Lateral margin of ischial tuberosity	Quadrate tubercle	Nerve to quadratus femoris muscle	Medial circumflex femoral artery	Laterally rotates thigh
Quadratus plantae m.	Foot	Medial and lateral margins of plantar surface of calcaneus	Posterolateral edge of flexor digitorum longus tendon	Lateral plantar nerve	Medial and lateral plantar arteries, plantar arch	Corrects for oblique pull of flexor digitorum longus tendon, thus assisting in flexion of digits of foot

Continued

MUSCLE	MUSCLE GROUP	PROXIMAL ATTACHMENT	DISTAL ATTACHMENT	INNERVATION	BLOOD SUPPLY	MAIN ACTIONS
Rectus femoris m.	Anterior thigh (quadriceps femoris)	Anterior inferior iliac spine, ilium superior to acetabulum	Tibial tuberosity (via patellar ligament)	Femoral nerve	Deep femoral and lateral circumflex femoral arteries	Extends leg and flexes thigh
Sartorius m.	Anterior thigh	Anterior superior iliac spine, ilium inferior to that spine	Superior part of medial surface of tibia	Femoral nerve	Femoral artery	Abducts, laterally rotates, and flexes thigh; flexes knee
Semimembranosus m.	Posterior thigh	Ischial tuberosity	Posterior part of medial condyle of tibia	Sciatic nerve (tibial division)	Perforating femoral arteries, medial circumflex femoral artery	Flexes leg, extends thigh
Semitendinosus m.	Posterior thigh	Ischial tuberosity	Superior part of medial surface of tibia	Sciatic nerve (tibial division)	Perforating femoral arteries, medial circumflex femoral artery	Flexes leg, extends thigh
Soleus m.	Posterior leg	Posterior surface of head of fibula, proximal one-fourth of posterior surface of fibula, soleal line of tibia	Posterior surface of calcaneus (via calcaneal tendon)	Tibial nerve	Popliteal, posterior tibial, and fibular arteries	Plantar flexes foot
Superior gemellus m.	Deep gluteal	External surface of ischial spine	Medial surface of greater trochanter of femur	Nerve to obturator internus muscle	Inferior gluteal and internal pudendal arteries	Laterally rotates extended thigh and abducts flexed thigh
Tensor fasciae latae	Superficial gluteal	Anterior superior iliac spine, anterior part of iliac crest	Lateral condyle of tibia (via iliotibial tract)	Superior gluteal nerve	Ascending branch of lateral circumflex femoral artery	Abducts, medially rotates, and flexes thigh; helps to keep knee extended
Tibialis anterior m.	Anterior leg	Lateral condyle of tibia, proximal half of lateral tibia, interosseous membrane of leg	Medial cuneiform bone and base of 1st metatarsal bone	Deep fibular nerve	Anterior tibial artery	Dorsiflexes foot and inverts foot
Tibialis posterior m.	Posterior leg	Posterior tibia below soleal line, interosseous membrane, proximal half of posterior fibula	Tuberosity of navicular bone, all cuneiform bones, cuboid bone, bases of 2nd through 4th metatarsal bones	Tibial nerve	Fibular artery	Plantar flexes foot and inverts foot
Vastus intermedius m.	Anterior thigh (quadriceps femoris)	Anterior and lateral surfaces of body of femur	Tibial tuberosity (via patellar ligament)	Femoral nerve	Lateral circumflex femoral and deep femoral arteries	Extends leg
Vastus lateralis m.	Anterior thigh (quadriceps femoris)	Greater trochanter, gluteal tuberosity, lateral lip of linea aspera	Tibial tuberosity (via patellar ligament)	Femoral nerve	Lateral circumflex femoral and deep femoral arteries	Extends leg
Vastus medialis m.	Anterior thigh (quadriceps femoris)	Intertrochanteric line, greater trochanter, gluteal tuberosity, lateral lip of linea aspera	Tibial tuberosity (via patellar ligament)	Femoral nerve	Femoral and deep femoral arteries	Extends leg

Variations in spinal nerve contributions to the innervation of muscles, their arterial supply, their attachments, and their actions are common themes in human anatomy. Therefore, expect differences between texts and realize that anatomical variation is normal.

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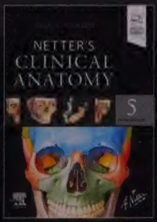

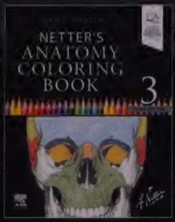

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ISBN 978-0-323-68042-4

9 780323 680424